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ENCYCLOPÆDIA BRITANNICA.

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M I E

Miel,
Mieris.

MIEL (JAN), called *Giovanni della Vite*, a most eminent painter, was born in Flanders in 1599. He was at first a disciple of Gerard Seghers, in whose school he made a distinguished figure; but he quitted that artist, and went to Italy, to improve himself in design, and to obtain a more extensive knowledge of the several branches of his art. At Rome he particularly studied and copied the works of the Caracci and Corregio; and was admitted into the academy of Andrea Sacchi, where he gave such evident proofs of extraordinary merit and genius, that he was invited by Andrea to assist him in a grand design which he had already begun. But Miel, through some disgust, rejected those elevated subjects which at first had engaged his attention, refused the friendly proposal of Sacchi, and chose to imitate the style of Bamboccio, as having more of that nature which pleased his own imagination. His general subjects were huntings, carnivals, gypsies, beggars, pastoral scenes, and conversations; of those he composed his easel-pictures, which are the finest of his performances. But he also painted history in a large size in fresco, and in oil; which, though they seem to want elevation of design, and a greater degree of grace in the heads, yet appear superior to what might be expected from a painter of such low subjects as he generally was fond of representing. His pictures of huntings are particularly admired: the figures and animals of every species being designed with uncommon spirit, nature, and truth. The transparence of his colouring, and the clear tints of his skies, enliven his compositions; nor are his paintings in any degree inferior to those of Bamboccio either in their force or lustre. His large works are not so much to be commended for the goodness of the design as for the expression and colouring; but it is in his small pieces that the pencil of Miel appears in its greatest delicacy and beauty. The singular merit of this master recommended him to the favour of Charles Emanuel duke of Savoy, who invited him to his court, where he appointed Miel his principal painter, and afterwards honoured him with the order of St Mauritius, and made him a present of a cross set with diamonds of a great value, as a particular mark of his esteem. He died in 1664.

MIERIS (Francis), the *Old*, a justly celebrated painter, was born at Leyden in 1635; and was at first placed under the direction of Abraham Toorne Vliet, one of the best designers of the Low Countries, and afterwards entered himself as a disciple with Gerard Douw. In a short time he far surpassed all his companions, and was by his master called the prince of his disciples. His manner of painting silks, velvets, stuffs, or carpets, was so singular, that the different kinds and fabric of any of them

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might easily be distinguished. His pictures are rarely to be seen, and as rarely to be sold; and when they are, the purchase is extremely high, their intrinsic value being so incontestably great. Beside portraits, his general subjects were conversations, persons performing on musical instruments, patients attended by the apothecary or doctor, chymists at work, mercers shops, and such like; and the usual valuation he set on his pictures was estimated at the rate of a ducat an hour. The finest portrait of this master's hand is that which he painted for the wife of Cornelius Plaats, which is said to be still preserved in the family, although very great sums have been offered for it. In the possession of the same gentleman was another picture of Mieris, representing a lady fainting, and a physician applying the remedies to relieve her. For that performance he was paid (at his usual rate of a ducat an hour) so much money as amounted to fifteen hundred florins when the picture was finished. The grand duke of Tuscany wished to purchase it, and offered three thousand florins for it, but the offer was not accepted. However, that prince procured several of his pictures, and they are at this day an ornament to the Florentine collection. One of the most curious of them is a girl holding a candle in her hand, and it is accounted inestimable. This painter died in 1681.

MIERIS (John), son of the former, was born at Leyden in 1660, and learned the art of painting from his father. The young artist unhappily was severely afflicted with the gravel and stone; and by those complaints was much hindered in the progress of his studies. But, after the death of his father, he travelled to Germany, and from thence to Florence, where the fame of his father's merit procured him a most honourable reception from the grand duke, who, when he saw some of his paintings, endeavoured to retain him in his service. But Mieris politely declined it, and proceeded to Rome, where his great abilities were well known before his arrival, and his works were exceedingly coveted. In that city his malady increased; yet at the intervals of ease he continued to work with his usual application, till the violence of his distemper ended his days in 1690, when he was only thirty years old. He was allowed to have been as eminent for painting in a large size as his father had been for his works in small.

MIERIS (William), called the *Young Mieris*, was brother to the former, and born at Leyden in 1662. During the life of his father, he made a remarkable progress: but, by being deprived of his director when he was only arrived at the age of nineteen, he had recourse to nature, as the most instructive guide; and by studying with diligence and judgment to imitate her, he approached near to the merit of his father. At

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GMS 17

Mieris
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Mignard.

first he took his subjects from private life, in the manner of Francis; such as tradesmen in their shops, or a peasant selling vegetables and fruit, and sometimes a woman looking out at a window; all which he copied minutely after nature, nor did he paint a single object without his model. As Mieris had observed the compositions of Gerard Laireffe, and other great historical painters, with singular delight, he attempted to design subjects in that style; and began with the story of Rinaldo sleeping on the lap of Armida, surrounded with the loves and graces, the fore-ground being enriched with plants and flowers; a work which added greatly to his fame, and was sold for a very high price. This master also painted landscapes and animals with equal truth and neatness; and modelled in clay and wax, in so sharp and accurate a manner, that he might justly be ranked among the most eminent sculptors. In the delicate finishing of his works, he imitated his father; as he likewise did in the lustre, harmony, and truth, of his paintings, which makes them to be almost as highly prized; but they are not equal in respect of design, or of the striking effect, nor is his touch so very exquisite as that of the father. The works of the old Mieris are better composed, the figures are better grouped, and they have less confusion; yet the younger Mieris is acknowledged to be an artist of extraordinary merit, although inferior to him, who had scarcely his equal. He died in 1747.

MIERIS (Francis), called the *Young Francis*, was the son of William, and the grandson of the celebrated Francis Mieris; and was born at Leyden in 1689. He learned the art of painting from his father, whose manner and style he always imitated; he chose the same subjects, and endeavoured to resemble him in his colouring and pencil. But with all his industry he proved far inferior to him: and most of those pictures which at the public sales are said to be of the young Mieris, and many also in private collections ascribed to the elder Francis, or William, are perhaps originally painted by this master, who was far inferior to both; or are only his copies after the works of those excellent painters, as he spent abundance of his time in copying their performances.

MIEZA, (anc. geog.), a town of Macedonia, which was anciently called *Strymonium*, situated near Stagira. Here, Plutarch informs us, the stone seats and shady walks of Aristotle were shown. Of this place was Peucestas, one of Alexander's generals, and therefore surnamed *Miezas*, (Arrian.)

MIGDOL, or MAGDOL, (anc. geog.), a place in the Lower Egypt, on this side Pihahiroth, or between it and the Red Sea, towards its extremity. The term denotes a tower or fortress. It is probably the *Magdolum* of Herodotus, seeing the Septuagint render it by the same name.

MIGNARD (Nicholas), a very ingenious French painter, born at Troyes in 1628; but, settling at Avignon, is generally distinguished from his brother Peter by the appellation of *Mignard of Avignon*. He was afterwards employed at court and at Paris, where he became rector of the royal academy of painting. There are a great number of his historical pieces and portraits in the palace of the Thuilleries. He died in 1690.

MIGNARD (Peter), the brother of Nicholas, was

born at Troyes in 1610; and acquired so much of the taste of the Italian school, as to be known by the name of the *Roman*. He was generally allowed to have a superior genius to his brother Nicholas; and had the honour of painting the popes Alexander VII. and Urban VIII. besides many of the nobility at Rome, and several of the Italian princes: his patron, Louis, sat ten times to him for his portrait, and respected his talents so much as to ennoble him, make him his principal painter after the death of Le Brun, and appoint him director of the manufactories. He died in 1695, and many of his pieces are to be seen at St Cloud.

MIGNON, or MINJON, (Abraham), a celebrated painter of flowers and still life, was born at Franckfort in 1639; and his father having been deprived of the greatest part of his substance by a series of losses in trade, left him in very necessitous circumstances when he was only seven years of age. From that melancholy situation he was rescued by the friendship of James Murel, a flower-painter in that city; who took Mignon into his own house, and instructed him in the art, till he was 17 years old. Murel had often observed an uncommon genius in Mignon: he therefore took him along with him to Holland, where he placed him as a disciple with David de Heem; and while he was under the direction of that master he laboured with incessant application to imitate the manner of De Heem, and ever afterwards adhered to it; only adding daily to his improvement, by studying nature with a most exact and curious observation.—

“When we consider the paintings of Mignon, one is at a loss (Mr Pilkington observes) whether most to admire the freshness and beauty of his colouring, the truth in every part, the bloom on his objects, or the perfect resemblance of nature visible in all his performances. He always shows a beautiful choice in those flowers and fruits from which his subjects are composed: and he groups them with uncommon elegance. His touch is exquisitely neat, though apparently easy and unlaboured; and he was fond of introducing insects among the fruits and flowers, wonderfully finished, so that even the drops of dew appear as round and as translucent as nature itself.” He had the good fortune to be highly paid for his works in his lifetime; and he certainly would have been accounted the best in his profession even to this day, if John Van Huysum had not appeared. Weyerman, who had seen many admired pictures of Mignon, mentions one of a most capital kind. The subject of it is a cat, which had thrown down a pot of flowers, and they lie scattered on a marble table. That picture is in every respect so wonderfully natural, that the spectator can scarce persuade himself that the water which is spilled from the vessel is not really running down from the marble. This picture is distinguished by the title of *Mignon's Cat*. This painter died in 1679, aged only 40.

MIGRATION, the passage or removal of a thing out of one place into another.

MIGRATION of Birds.—It has been generally believed, that many different kinds of birds annually pass from one country to another, and spend the summer or the winter where it is most agreeable to them; and that even the birds of our own island will seek the most distant southern regions of Africa, when directed by a peculiar instinct to leave their own country. It has

Mignon,
Migration.

Migration. long been an opinion pretty generally received, that swallows reside during the winter-season in the warm southern regions; and Mr Adanson particularly relates his having seen them at Senegal when they were obliged to leave this country. But besides the swallow, Mr Pennant enumerates many other birds which migrate from Britain at different times of the year, and are then to be found in other countries; after which they again leave these countries, and return to Britain. The reason of these migrations he supposes to be a defect of food at certain seasons of the year, or the want of a secure asylum from the persecution of man during the time of courtship, incubation, and nutrition. The following is his list of the migrating species.

1. *Crows*. Of this genus, the hooded crow migrates regularly with the woodcock. It inhabits North Britain the whole year: a few are said annually to breed on Dartmoor, in Devonshire. It breeds also in Sweden and Austria: in some of the Swedish provinces it only shifts its quarters, in others it resides throughout the year. Our author is at a loss for the summer retreat of those which visit us in such numbers in winter, and quit our country in the spring; and for the reason why a bird, whose food is such that it may be found at all seasons in this country, should leave us.

2. *Cuckoo*. Disappears early in autumn; the retreat of this and the following bird is quite unknown to us.

3. *Wryneck*. Is a bird that leaves us in the winter. If its diet be ants alone, as several assert, the cause of its migration is very evident. This bird disappears before winter, and revisits us in the spring a little earlier than the cuckoo.

4. *Hoopoe*. Comes to England but by accident: Mr Pennant once indeed heard of a pair that attempted to make their nest in a meadow at Selborne, Hampshire, but were frightened away by the curiosity of people. It breeds in Germany.

5. *Grouse*. The whole tribe, except the quail, lives here all the year round: that bird either leaves us, or else retires towards the sea-coasts.

6. *Pigeons*. Some few of the ring-doves breed here; but the multitude that appears in the winter is so disproportioned to what continue here the whole year, as to make it certain that the greatest part quit the country in the spring. It is most probable they go to Sweden to breed, and return from thence in autumn; as Mr Ekmark informs us they entirely quit that country before winter. Multitudes of the common wild pigeons also make the northern retreat, and visit us in winter; not but numbers breed in the high cliffs in all parts of this island. The turtle also probably leaves us in the winter, at least changes its place, removing to the southern counties.

7. *Stare*. Breeds here. Possibly several remove to other countries for that purpose, since the produce of those that continue here seems unequal to the clouds of them that appear in winter. It is not unlikely that many migrate into Sweden, where Mr Berger observes they return in spring.

8. *Thrushes*. The fieldfare and the redwing breed and pass their summers in Norway and other cold countries; their food is berries, which abounding in our kingdoms, tempts them here in the winter. These two and the Royston crow are the only land-birds that re-

gularly and constantly migrate into England, and do not breed here. The hawfinch and crossbill come here at such uncertain times as not to deserve the name of birds of passage.

9. *Chatterer*. The chatterer appears annually about Edinburgh in flocks during winter; and feeds on the berries of the mountain-ash. In South Britain it is an accidental visitant.

10. *Grosbeaks*. The grosbeak and crossbill come here but seldom; they breed in Austria. The pine grosbeak probably breeds in the forests of the Highlands of Scotland.

11. *Buntings*. All the genus inhabits England throughout the year; except the greater brambling, which is forced here from the north in very severe seasons.

12. *Finches*. All continue in some parts of these kingdoms, except theiskin, which is an irregular visitant, said to come from Russia. The linnets shift their quarters, breeding in one part of this island, and remove with their young to others. All finches feed on the seeds of plants.

13. *Larks, fly-catchers, wagtails, and warblers*. All of these feed on insects and worms; yet only part of them quit these kingdoms; though the reason of migration is the same to all. The nightingale, blackcap, fly-catcher, willow-wren, wheat-ear, and white-throat, leave us before winter, while the small and delicate golden-crested wren braves our severest frosts. The migrants of this genus continue longest in Great Britain in the southern counties, the winter in those parts being later than in those of the north; Mr Stillingfleet having observed several wheat-ears in the isle of Purbeck on the 18th of November. As these birds are incapable of very distant flights, Spain, or the south of France, is probably their winter-asylum.

14. *Swallows and goat-sucker*. Every species disappears at the approach of winter.

WATER-FOWL.

Of the vast variety of water-fowl that frequent Great Britain, it is amazing to reflect how few are known to breed here: the cause that principally urges them to leave this country, seems to be not merely the want of food, but the desire of a secure retreat. Our country is too populous for birds so shy and timid as the bulk of these are: when great part of our island was a mere waste, a tract of woods and fen, doubtless many species of birds (which at this time migrate) remained in security throughout the year.—Egrets, a species of heron now scarce known in this island, were in former times in prodigious plenty; and the crane, that has totally forsaken this country, bred familiarly in our marshes: their place of incubation, as well as of all other cloven-footed water-fowl (the heron excepted), being on the ground, and exposed to every one. As rural economy increased in this country, these animals were more and more disturbed; at length, by a series of alarms, they were necessitated to seek, during the summer, some lonely safe habitation.

On the contrary, those that build or lay in the almost inaccessible rocks that impend over the British seas, breed there still in vast numbers, having little to fear from the approach of mankind: the only disturb-

Migration. — once they meet with in general being from the desperate attempts of some few to get their eggs.

CLOVEN-FOOTED WATER-FOWL.

15. *Heron*. The white heron is an uncommon bird, and visits us at uncertain seasons; the common kind and the bittern never leave us.

16. *Curlews*. The curlew breeds sometimes on our mountains; but, considering the vast flights that appear in winter, it is probable that the greater part retire to other countries: the whimbrel breeds on the Grampian hills, in the neighbourhood of Invercauld.

17. *Snipes*. The woodcock breeds in the moist woods of Sweden, and other cold countries. Some snipes breed here, but the greatest part retire elsewhere; as do every other species of this genus.

18. *Sandpipers*. The lapwing continues here the whole year; the ruff breeds here, but retires in winter; the redshank and sandpiper breed in this country, and reside here. All the others absent themselves during summer.

19. *Plovers and oyster-catcher*. The long-legged plover and sanderling visit us only in winter; the dotterel appears in spring and in autumn; yet, what is very singular, we do not find it breeds in south Britain. The oyster-catcher lives with us the whole year. The Norfolk plover and sea-lark breed in England. The green plover breeds on the mountains of the north of England, and on the Grampian hills.

We must here remark, that every species of the genera of curlews, woodcocks, sandpipers, and plovers, that forsake us in the spring, retire to Sweden, Poland, Prussia, Norway, and Lapland, to breed: as soon as the young can fly, they return to us again, because the frosts which set in early in those countries totally deprive them of the means of subsisting; as the dryness and hardness of the ground, in general, during our summer, prevent them from penetrating the earth with their bills, in search of worms, which are the natural food of these birds. Mr Ekmark speaks thus of the retreat of the whole tribe of cloven-footed water fowl out of his country (Sweden) at the approach of winter; and Mr Klein gives much the same account of those of Poland and Prussia.

20. *Rails and gallinules*. Every species of these two genera continue with us the whole year; the land-rail excepted, which is not seen here in winter. It likewise continues in Ireland only during the summer-months, when they are very numerous, as Mr Smith tells us in the *History of Waterford*, p. 336. Great numbers appear in Anglesea the latter end of May; it is supposed that they pass over from Ireland, the passage between the two islands being but small. As we have instances of these birds lighting on ships in the channel and the Bay of Biscay, we may conjecture their winter-quarters to be in Spain.

FINNED-FOOTED WATER-BIRDS.

21. *Phalaropes*. Visit us but seldom; their breeding place is Lapland, and other arctic regions.

22. *Grebes*. The great-crested grebe, the black and white grebe, and little grebe, breed with us, and never migrate; the others visit us accidentally, and breed in Lapland.

WEB-FOOTED BIRDS.

23. *Avoset*. Breed near Fossdike in Lincolnshire;

but quit their quarters in winter. They are then shot in different parts of the kingdom, which they visit, not regularly, but accidentally.

24. *Auks and guillemots*. The great auk or penguin sometimes breeds in St Kilda. The auk, the guillemot, and puffin, inhabit most of the maritime cliffs of Great Britain, in amazing numbers, during summer. The black guillemot breeds in the Bass Isle, and in St Kilda, and sometimes in Llandidno rocks. We are at a loss for the breeding place of the other species; neither can we be very certain of the winter residence of any of them, excepting of the lesser guillemot and black-billed auk, which, during winter, visit in vast flocks the Frith of Forth.

25. *Divers*. These chiefly breed in the lakes of Sweden and Lapland, and in some countries near the pole; but some of the red-throated divers, the northern and the imber, may breed in the north of Scotland and its isles.

26. *Terns*. Every species breeds here; but leaves us in the winter.

27. *Petrels*. The fulmar breeds in the Isle of St Kilda, and continues there the whole year except September and part of October: the shearwater visits the Isle of Man in April; breeds there; and, leaving it in August or the beginning of September, disperses over all parts of the Atlantic ocean. The stormfinch is seen at all distances from land on the same vast watery tract; nor is ever found near the shore except by some very rare accident, unless in the breeding season. Mr Pennant found it on some little rocky isles, off the north of Skie. It also breeds in St Kilda. He also suspects that it nestles on the Blasquet Isles off Kerry, and that it is the gaurder of Mr Smith.

28. *Mergansers*. This whole genus is mentioned among the birds that fill the Lapland lakes during summer. Mr Pennant has seen the young of the red-breasted in the north of Scotland: a few of these, and perhaps of the goosanders, may breed there.

29. *Ducks*. Of the numerous species that form this genus, we know of few that breed here: The swan and goose, the shield-duck, the eider-duck, a few shovelers, garganies, and teals, and a very small portion of the wild ducks.

The rest contribute to form that amazing multitude of water-fowl that annually repair from most parts of Europe to the woods and lakes of Lapland and other arctic regions, there to perform the functions of incubation and nutrition in full security. They and their young quit their retreat in September, and disperse themselves over Europe. With us they make their appearance the beginning of October; circulate first round our shores; and, when compelled by severe frost, betake themselves to our lakes and rivers. Of the web-footed fowl there are some of hardier constitutions than others: these endure the ordinary winters of the more northern countries; but when the cold reigns there with more than common rigour, they repair for shelter to these kingdoms: this regulates the appearance of some of the diver kind, as also of the wild swans, the swallow-tailed shield-duck, and the different sorts of goosanders which then visit our coasts. Barentz found the barnacles with their nests in great numbers in Nova Zembla. (*Collect. Voy. Dutch East-India Company*, 8vo. 1703, p. 19.) Clusius, in his *Exot.* 368. also

Migration. also observes, that the Dutch discovered them on the rocks of that country and in Waygate Straits. They, as well as the other species of wild-geese, go very far north to breed, as appears from the histories of Greenland and Spitzbergen, by Egede and Crantz. These birds seem to make Iceland a resting place, as Horrebow observes: few continue there to breed, but only visit that island in the spring, and after a short stay retire still further north.

30. *Corvorants.* The corvorant and shag breed on most of our high rocks: the gannet in some of the Scotch isles, and on the coast of Kerry: the two first continue on our shores the whole year. The gannet disperses itself all round the seas of Great Britain, in pursuit of the herring and pilchard, and even as far as the Tagus to prey on the sardina.

But of the numerous species of fowl here enumerated, it may be observed how very few intrust themselves to us in the breeding season, and what a distant flight they make to perform the first great dictate of nature.

There seems to be scarcely any but what we have traced to Lapland, a country of lakes, rivers, swamps, and alps, covered with thick and gloomy forests, that afford shelter during summer to these fowls, which in winter disperse over the greatest part of Europe. In those arctic regions, by reason of the thickness of the woods, the ground remains moist and penetrable to the woodcocks, and other slender-billed fowl: and for the web-footed birds, the waters afford larvæ innumerable of the tormenting knat. The days there are long; and the beautiful meteorous nights indulge them with every opportunity of collecting so minute a food: whilst mankind is very sparingly scattered over that vast northern waste.

Why then should Linnæus, the great explorer of these rude deserts, be amazed at the myriads of water-fowl that migrated with him out of Lapland? which exceeded in multitude the army of Xerxes; covering, for eight whole days and nights, the surface of the river Calix! His partial observation as a botanist, would confine their food to the vegetable kingdom, almost denied to the Lapland waters; inattentive to a more plenteous table of insect food, which the all-bountiful Creator had spread for them in the wilderness. It may be remarked, that the lakes of mountainous rocky countries in general are destitute of plants: few or none are seen on those of Switzerland; and Linnæus makes the same observation in respect to those of Lapland; having, during his whole tour, discovered only a single specimen of a *lemma trifolca*, or "ivy-leaved duck's meat," *Flora Lap.* n° 470.; a few of the *scirpus lacustris*, or "bullrush," n° 18.; the *alopecurus geniculatus*, or "fote foxtail grass," n° 38.; and the *ranunculus aquatilis*, n° 234.; which are all he enumerates in his *Prolegomena* to that excellent performance.

Under the article SWALLOW will be found the principal arguments for and against the migration of swallows. Here we shall give a short abstract of the arguments used by the Hon. Daines Barrington against the migration of birds in general, from a paper published by him in the 62d volume of the Philosophical Transactions. This gentleman denies that any well-attested instances can be produced of this supposed mi-

gration; which, he thinks, if there were any such periodical flight, could not possibly have escaped the frequent observation of seamen. It has indeed been asserted that birds of passage become invisible in their flight, because they rise too high in the air to be perceived, and because they choose the night for their passage. The author, however, expresses his doubts "whether any bird was ever seen to rise to a greater height than perhaps twice that of St. Paul's cross;" and he further endeavours to show, that the extent of some of these supposed migrations (from the northern parts of Europe, for instance, to the line) is too great to be accounted for, by having recourse to the argument founded on a nocturnal passage.

The author next recites, in a chronological order, all the instances that he has been able to collect, of birds having been actually seen by mariners when they were crossing a large extent of sea; and he endeavours to show that no stress can be laid on the few casual observations of this kind that have been produced in support of the doctrine of a regular and periodical migration.

Mr Barrington afterwards proceeds to invalidate M. Adanson's celebrated observation with respect to the migration of the swallow in particular, and which has been considered by many as perfectly decisive of the present question. He endeavours to show that the four swallows which that naturalist caught, on their settling upon his ship, on the 6th of October at about the distance of 50 leagues from the coast of Senegal, and which he supposes to have been then proceeding from Europe to pass the winter in Africa, could not be true European swallows; or, if they were, could not have been on their return from Europe to Africa. His objections are founded principally on some proofs which he produces of M. Adanson's want of accuracy on this subject, which has led him, in the present instance, to mistake two African species of the swallow-tribe, described and engraved by Brisson, for European swallows, to which they bear a general resemblance; or granting even that they were European swallows, he contends, that they were flitting from the Cape de Verd Islands to the coast of Africa; "to which short flight, however, they were unequal, and accordingly fell into the sailor's hands." See the article SWALLOW.—We shall here only add, in opposition to the remarks of Mr Barrington, the following observations of the Rev. Mr White* in a letter to Mr Pennant on this subject.

"We must not (says he) deny migration in general; because migration certainly does subsist in some places, as my brother in Andalusia has fully informed me. Of the motions of these birds he has ocular demonstration, for many weeks together, both spring and fall: during which periods myriads of the swallow kind traverse the Straits from north to south, and from south to north, according to the season. And these vast migrations consist not only of hirundines, but of bee-birds, hoopoes, oro pendolos, or golden thrushes, &c. &c. and also of many of our soft-billed summer birds of passage; and moreover of birds which never leave us, such as all the various sorts of hawks and kites. Old Belon, 200 years ago, gives a curious account of the incredible armies of hawks and kites which he saw in the spring-time traversing the Thra-

cian

Migration.

* *Natural History of Selborne*, Letter ix. p. 139.

Migration. cian Bosphorus from Asia to Europe. Besides the above mentioned, he remarks, that the procession is swelled by whole troops of eagles and vultures.

"Now it is no wonder that birds residing in Africa should retreat before the sun as it advances, and retire to milder regions, and especially birds of prey, whose blood being heated with hot animal food, are more impatient of a sultry climate: but then I cannot help wondering why kites and hawks, and such hardy birds as are known to defy all the severity of England, and even of Sweden and all north Europe, should want to migrate from the south of Europe, and be dissatisfied with the winters of Andalusia.

"It does not appear to me that much stress may be laid on the difficulty and hazard that birds must run in their migrations, by reason of vast oceans, cross winds, &c.; because, if we reflect, a bird may travel from England to the equator without launching out and exposing itself to boundless seas, and that by crossing the water at Dover and again at Gibraltar. And I with the more confidence advance this obvious remark, because my brother has always found that some of his birds, and particularly the swallow kind, are very sparing of their pains in crossing the Mediterranean: for when arrived at Gibraltar, they do not,

———"rang'd in figure, wedge their way,

———"and set forth

"Their airy caravan high over seas

"Flying, and over lands with mutual wing

"Easing their flight."

MILTON.

but scout and hurry along in little detached parties of six or seven in a company; and sweeping low, just over the surface of the land and water, direct their course to the opposite continent at the narrowest passage they can find. They usually slope across the bay to the south-west, and so pass over opposite to Tangier, which it seems is the narrowest space.

"In former letters we have considered whether it was probable that woodcocks in moon-shiny nights cross the German ocean from Scandinavia. As a proof that birds of less speed may pass that sea, considerable as it is, I shall relate the following incident, which, though mentioned to have happened so many years ago, was strictly matter of fact:—As some people were shooting in the parish of Trotton, in the county of Sussex, they killed a duck in that dreadful winter 1708-9, with a silver collar about its neck (I have read a like anecdote of a swan), on which were engraven the arms of the king of Denmark. This anecdote the rector of Trotton at that time has often told to a near relation of mine; and, to the best of my remembrance, the collar was in the possession of the rector.

"At present I do not know any body near the seaside that will take the trouble to remark at what time of the moon woodcocks first come. One thing I used to observe when I was a sportsman, that there were times in which woodcocks were so sluggish and sleepy that they would drop again when flushed just before the spaniels, nay just at the muzzle of a gun that had been fired at them: whether this strange laziness was the effect of a recent fatiguing journey, I shall not presume to say.

"Nightingales not only never reach Northumber-

land and Scotland, but also, as I have been always told, St. Miguel, Devonshire and Cornwall. In those two last counties we cannot attribute the failure of them to the want of warmth: the defect in the west is rather a presumptive argument that these birds come over to us from the continent at the narrowest passage, and do not stroll so far westward."

MIGRATION of Fishes. See CLUPEA.

ST MIGUEL, one of the Azore islands, situated in W. Long. 22. 45. N. Lat. 38. 10. This island appears to be entirely volcanic. The best account we have of it hath been published in the 68th volume of the Philosophical Transactions by Mr Francis Masson. According to him, the productions differ greatly from those of Madeira, inasmuch that none of the trees of the latter are found here, except the faya: it has a nearer affinity to Europe than Africa. The mountains are covered with the erica vulgaris, and an elegant ever-green shrub very like a phillyrea, which gives them a most beautiful appearance.

It is one of the principal and most fertile of the Azorian islands, lying nearly east and west. Its length is about 18 or 20 leagues; its breadth unequal, not exceeding five leagues, and in some places not more than two. It contains about 80,000 inhabitants.

Its capital, the city of Ponta del Guda, which contains about 12,000 inhabitants, is situated on the south side of the island, on a fine fertile plain country, pretty regularly built; the streets straight, and of a good breadth. It is supplied with good water, which is brought about the distance of three leagues from the neighbouring mountains. The churches and other religious edifices are elegant and well built for such an island. There is a large convent of Franciscan friars and one of the order of St Augustin, four convents for professed nuns, and three Recolimentos for young women and widows who are not professed. The vessels anchor in an open road; but it is not dangerous, as no wind can prevent their going to sea in case of stormy weather.

The country round the city is plain for several miles, well cultivated, and laid out with good taste into spacious fields, which are sown with wheat, barley, Indian corn, pulse, &c. and commonly produce annually two crops; for as soon as one is taken off, another is immediately sown in its place. The soil is remarkably gentle and easy to work, being for the most part composed of pulverised pumice-stone. There are in the plains a number of pleasant country-seats, with orchards of orange-trees, which are esteemed the best in Europe.

The second town is Ribeira Grande, situated on the north side of the island, containing about as many inhabitants as the city; a large convent of Franciscan friars, and one of nuns. It gives title to a count, called the *Conde Ribeira Grande*, who first instituted linen and woollen manufactories in the island.

The third town is Villa Franca, on the south side of the island, about six leagues east of Ponta del Guda. It has a convent of Franciscan friars, and one of nuns, which contains about 300. Here, about half a mile from the shore, lies a small island (Ilhao), which is hollow in the middle, and contains a fine basin with only one entrance into it, fit to hold 50 sail of vessels secure from all weather; at present it wants cleaning out,

St Miguel. out, as the winter rain washes down great quantities of earth into it, which has greatly diminished its depth. But vessels frequently anchor between this island and the main.

Beside these towns are several smaller, *viz.* Alagoa, Agoa de Pao, Brelanha, Fanaes de Ajuda, and a number of hamlets, called *lugars* or *places*.

About four leagues north-east from Villa Franca, lies a place called the *Furnas*, being a round deep valley in the middle of the east part of the island, surrounded with high mountains, which, though steep, may be easily ascended on horseback by two roads. The valley is about five or six leagues in circuit. The face of the mountains, which are very steep, is entirely covered with beautiful ever-greens, *viz.* myrtles, laurels, a large species of bilberry called *uva de ferra*, &c. and numberless rivulets of the purest water run down their sides. The valley below is well cultivated, producing wheat, Indian corn, flax, &c. The fields are planted round with a beautiful sort of poplars, which grow into pyramidal forms, and by their careless, irregular disposition, together with the multitude of rivulets, which run in all directions through the valley, a number of boiling fountains throwing up clouds of steam, a fine lake in the south-west part about two leagues round, compose a prospect the finest that can be imagined. In the bottom of the valley the roads are smooth and easy, there being no rocks but a fine pulverised pumice-stone that the earth is composed of.

There are a number of hot fountains in different parts of the valley, and also on the sides of the mountains: but the most remarkable is that called the *chaldreira*, situated on the eastern part of the valley, on a small eminence by the side of a river, on which is a basin about 30 feet diameter, where the water continually boils with prodigious fury. A few yards distant from it is a cavern in the side of the bank, in which the water boils in a dreadful manner, throwing out a thick, muddy, unctuous water several yards from its mouth with a hideous noise. In the middle of the river are several places where the water boils up so hot, that a person cannot dip his finger into it without being scalded; also along its banks are several apertures, out of which the steam rises to a considerable height, so hot that there is no approaching it with one's hand: in other places, a person would think that 100 smiths bellows were blowing altogether, and sulphureous steams issuing out in thousands of places; so that native sulphur is found in every chink, and the ground covered with it like hoar-frost; even the bushes that happen to lie near these places are covered with pure brimstone, condensing from the steam that issues out of the ground, which in many places is covered over with a substance like burnt alum. In these small caverns, where the steam issues out, the people often boil their yams.

Near these boiling fountains are several mineral springs; two in particular, whose waters have a very strong quality, of an acid taste, and bitter to the tongue.

About half a mile to the westward, and close by the river side, are several hot springs, which are used by sick people with great success. Also, on the side of a hill west of St Ann's church, are many others, with

three bathing-houses, which are most commonly used. *St Miguel.* These waters are very warm, although not boiling hot; but at the same place issue several streams of cold mineral water, by which they are tempered, according to every one's liking.

About a mile south of this place, and over a low ridge of hills, lies a fine lake about two leagues in circumference, and very deep, the water thick, and of a greenish colour. At the north end is a plain piece of ground, where the sulphureous steams issue out in many places, attended with a surprising blowing noise. Our author could observe strong springs in the lake, but could not determine whether they were hot or cold: this lake seems to have no visible evacuation. The other springs immediately form a considerable river, called *Ribeira Quente*, which runs a course about two or three leagues, through a deep rent in the mountains, on each side of which are several places where the smoke issues out. It discharges itself into the sea on the south side, near which are some places where the water boils up at some distance in the sea.

This wonderful place had been taken little notice of until very lately: so little curiosity had the gentlemen of the island, that scarcely any of them had seen it, until of late some persons, afflicted with very virulent disorders, were persuaded to try its waters, and found immediate relief from them. Since that time it has become more and more frequented; several persons who had lost the use of their limbs by the dead palsy have been cured; and also others who were troubled with eruptions on their bodies.

A clergyman, who was greatly afflicted with the gout, tried the said waters, and was in a short time perfectly cured, and has had no return of it since. When Mr Masson was there, several old gentlemen, who were quite worn out with the said disorder, were using the waters, and had received incredible benefit from them; in particular, an old gentleman about 60 years of age, who had been tormented with that disorder more than 20 years, and often confined to his bed for six months together: he had used these waters about three weeks, had quite recovered the use of his limbs, and walked about in the greatest spirits imaginable. A friar also who had been troubled with the said disorder about 12 years, and reduced to a cripple, by using them a short time was quite well, and went a-hunting every day.

There are several other hot springs in the island, particularly at Ribeira Grande; but they do not possess the same virtues, at least not in so great a degree.

The east and west part of the island rises into high mountains; but the middle is low, interspersed with round conic hills, all of which have very recent marks of fire; all the parts below the surface consisting of melted lava lying very hollow.

Most of the mountains to the westward have their tops hollowed out like a punch-bowl, and contain water. Near the west end is an immense deep valley like the *Furnas* called the *Sete Cidades*. This valley is surrounded with very abrupt mountains, about seven or eight leagues round; in the bottom is a deep lake of water, about three leagues in circuit, furnished with great number of water-fowls. This water has no mineral quality; neither are there any hot springs in the valley. All these mountains are composed of a white

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white crumbly pumice-stone, which is so loose, that if a person thrust a stick into the banks, whole wagon-loads of it will tumble down. The inhabitants of the island relate a story, that he who first discovered it observed an extraordinary high peak near the west end; but the second time he visited it, no such peak was to be seen, which he supposed must have certainly sunk: but, however improbable this story may be, at some period or another it must have certainly been the case.

MILAN, or the duchy of the Milanese, a country of Italy, bounded on the west by Savoy, Piedmont, and Montferrat; by Switzerland on the north; by the territories of Venice, the duchies of Mantua, Parma, and Placentia, on the east; and by the territories of Genoa on the south.

Anciently this duchy, containing the north part of the Old Liguria, was called *Insubria*, from its inhabitants the *Insubres*; who were conquered by the Romans, as these were by the Goths; who in their turn were subdued by the Lombards. Didier, the last king of the Lombards, was taken prisoner by Charlemagne, who put an end to the Longobardic empire, and appointed governors of Milan. These governors, being at a distance from their masters, soon began to assume an independency, which brought a dreadful calamity on the country; for, in 1152, the capital itself was levelled with the ground by the emperor Frederic Barbarossa, who committed great devastations otherwise throughout the duchy. Under this emperor lived one Galvian, a nobleman who was descended from Otho a Milanese. Galvian, along with William prince of Montferrat, served in the crusade, when Godfrey of Boulogne took Jerusalem: he killed in single combat the Saracen general, whom he stripped of his helmet, which was adorned with the image of a serpent swallowing a youth; and this ever afterwards was the badge of that family. His grandson Galvian, having opposed the emperor, was taken prisoner, and carried in irons into Germany, from whence he made his escape, and returned to Milan, died in the service of his country. From him descended another Otho, at the time that Otho IV. was emperor of Germany, and who soon distinguished himself by the accomplishments both of his mind and body. When he grew up, he was received into the family of cardinal Octavian Ubaldini at Rome. This prelate, who was himself aspiring at the popedom, was in a short time greatly taken with the address and accomplishments of young Otho, and predicted his future greatness. In the mean time, one Torress, or Torriano, a Milanese nobleman of unbounded ambition, was attempting to make himself master of Milan. The popular faction had some time before been caballing against the nobility; and at last, Torriano, putting himself at their head, expelled the bishop, and put to death or banished all the nobility: by which means the popular government was fully established; and Torriano, under this pretence, ruled every thing as he pleased. He was, however, soon opposed by one Francisco Sepri, who formed a great party, pretending to deliver the city from Torriano's haughtiness and cruelty. But while the two parties were collecting their forces against each other, cardinal Ubaldini was projecting the destruction of both, by

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means of his favourite Otho. This prelate had for some time borne an implacable hatred to Torriano, because he had been by him prevented from carrying out of the treasury of St Ambrose's church at Milan, a carbuncle or jewel of great value, which he pretended to reserve for adorning the papal tiara; for which reason he now determined to oppose his ambition.

Ubaldini began with naming Otho archbishop of Milan; which, as the pope's legate, he had a right to do. This nomination was confirmed by Pope Urban IV.; and the party of the nobility having now got a head from the pope himself, began to gather strength. Otho in the mean time employed himself in collecting troops; and had no sooner procured a show of an army, than he advanced towards Lago Maggiore, and took possession of Arona, a strong post near that lake: but Torriano, marching immediately against him with all his troops, obliged him to abandon the place, and leave his party to make the best terms they could with the conqueror. This was followed by the destruction of the castles of Arona, Anghiari, and Brebia: soon after which Torriano died, and was succeeded by his brother Philip, who had sufficient interest to get himself elected podesta, or prætor of Milan, for ten years. During his lifetime, however, the party of the nobility increased considerably under Otho, notwithstanding the check they had received. Philip died in 1265, having lost ground considerably in the affections of the people, though he obtained a great reputation for his courage and conduct. His successor Napi rendered himself terrible to nobility, whom he proscribed, and put to death as often as he could get them into his power. He proceeded such lengths, and acted with such fury against that unfortunate party, that pope Clement IV. who had succeeded Urban, at last interdicted Milan, and excommunicated Napi and all his party. By this Napi began to lose his popularity, and the public disaffection towards him was much heightened by the natural cruelty of his temper. But in the mean time, the party of the nobility was in the utmost distress. Otho himself and his friends, having spent all their substance, wandered about from place to place; the pope not being in a capacity of giving them any assistance. Otho, however, was not discouraged by his bad success, but found means still to keep up the spirits of his party, who now chose for their general Squarcini Burri, a man of great eminence and courage, whose daughter was married to Matthew Visconti, afterwards called *Matthew the Great*. At the same time they renewed their confederacy with the marquis of Montferrat, who was son-in-law to the king of Spain. The marquis agreed to this confederacy chiefly with a view to become master of the Milanese.

The nobility now again began to make head; and having collected an army, which was joined by 600 Spanish cavalry and a body of foot, gained some advantages. But in the mean time Napi, having gathered together a superior army, suddenly attacked Otho and Burri, and defeated them. After this disaster Otho applied to the pope; from whom, however, he did not obtain the assistance he desired; and in the mean time Napi invited the emperor Rodolph into Italy, with the promise of being crowned at Milan. This invitation was accepted of with great readiness

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by Rodolph; who constituted Napi his governor and vicar-general in Lombardy, sending to him at the same time a fine body of German horse, the command of which was given to Cassoni, Napi's nephew. On this Otho again applied to the pope (Gregory X.); but he was so far from granting him any assistance, that he is said to have entered into a scheme of assassinating him privately; but Otho escaped the danger, and in 1276 began to recover his affairs. The reason of pope Gregory's enmity to him was, that he and his party were thought to be Gibelines, and were opposed by great numbers of the nobility themselves; but after that pope's death, the Milanese exiles being united under one head, soon became formidable. They now chose for their general Godfrey count of Langusio, a noble Pavian, and an inveterate enemy of the Torriano family. This nobleman being rich and powerful, enlisted many German and other mercenaries, at whose head he marched towards the Lago Maggiore. All the towns in that country opened their gates to him, through the interest of the Visconti family, who resided in these parts. But this success soon met with a severe check in an unfortunate engagement, wherein Godfrey was defeated and taken prisoner; after which he and 34 nobles had their heads struck off, and sent from the field of battle piled up in a common waggon.

This defeat greatly affected Otho; but having in a short time recovered himself, he again attacked his enemies, and defeated them; but, suffering his troops to grow remiss after their victory, the fugitives rallied, and entirely defeated him. The next year, however, Otho had better success, and totally defeated and took prisoner Napi himself. After this victory Cassoni was obliged to abandon Milan to his competitor, who kept possession of it till his death, which happened in 1295, in the 87th year of his age.

Otho was succeeded by Matthew Visconti above-mentioned; and Milan continued in subjection to that family without any very memorable occurrence till the year 1378, when, by the death of Galeazzo II. his brother Barnabo became sovereign of Milan. He was of a brave and active disposition; but excessively profuse in his expences, as his brother Galeazzo had also been; and to procure money to supply his extravagancies, was obliged to oppress his subjects. Galeazzo had engaged in an enterprise against Bologna, and the siege of it was continued by Barnabo. It lasted for nine years; and during this time is said to have cost 300 millions of gold, a prodigious sum in those days, near 40 millions sterling; the lowest gold coin being in value somewhat more than half-a-crown English. Both the brothers were excessively fond of building. Barnabo erected a bridge over the Adda, consisting of three stories; the lowest for chariots and heavy carriages, the middle for horses, and the uppermost for foot-passengers. He built also another bridge which was carried over houses without touching them. To accomplish these, and many other expensive schemes, he became one of the greatest tyrants imaginable, and every day produced fresh instances of his rapacity and cruelty. He instituted a chamber of inquiry, for punishing all those who had for five years before been guilty of killing boars, or

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even of eating them at the table of another. They who could not redeem themselves by money were hanged, and above 100 wretches perished in that manner. Those who had any thing to lose were stripped of all their substance, and obliged to labour at the fortifications and other public works. He obliged his subjects to maintain a great many hunting-dogs, and each district was taxed a certain number. The overseers of his dogs were at the same time the instruments of his rapacity. When the dogs were poor and slender, the owners were always fined; but when the dogs were fat, the owners were also fined for suffering them to live without exercise.

The extravagant behaviour of Barnabo soon rendered public affairs ready for a revolution, which was at last accomplished by his nephew John Galeazzo. He affected a solitary life, void of ambition, and even inclining to devotion; but at the same time took care to have his uncle's court filled with spies, who gave him information of all that passed. He reduced his table and manner of living, pretending that he took these steps as preparatives to a retirement from the world, which was soon to take place, after he had paid a religious vow. In short, he acted his part so well, that even Barnabo, though abundantly cautious, had no suspicion of his having any designs against him; and so entirely did he conceal his ambition, that he several times made application to his uncle for his interest to procure him a quiet retreat as soon as his religious vows were performed. One of these was to pay a visit to the church of the blessed Virgin upon mount Varezio. This was to be done with so much secrecy that all kinds of eye-witnesses were to be excluded; and it was with difficulty that Barnabo himself and two of his sons were allowed to accompany our devotee. But, in the mean time, the hypocritical Galeazzo had soldiers advancing from all quarters; so that Barnabo and his sons were immediately seized, and the houses of those who had sided with them given up to be plundered. The booty in plate, money, and all kinds of rich furniture, was immense. The ministers of the late government were dragged from their hiding-places, and put to death; and at last the citadel itself fell into the hands of Galeazzo, who found in it an immense sum of money. Barnabo was carried prisoner to Tritici, a castle of his own building, where he had the happiness to find one person still faithful to him. This was his mistress, named *Dominia Porra*; who, when he was abandoned by all the world, shut herself up a voluntary prisoner in his chamber, and remained with him as long as he lived, which was only seven months after his degradation.

John Galeazzo was the first who took upon him the title of the *duke of Milan*, and was a prince of great policy and no less ambition. He made war with the Florentines, became master of Pisa and Bologna, and entirely defeated the emperor in 1401, so that he entertained hopes of becoming master of all Lombardy, and cutting off all possibility of invading it either from France or Germany; but his designs were frustrated by death, which happened in 1402, in the 55th year of his age. After his decease the Milanese government fell into the most violent distractions, so that it

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could not be supported, even in time of peace, without an army of 20,000 foot and as many horse. In the year 1421, however, Philip duke of Milan became master of Genoa; but though he gained great advantages in all parts of Italy, the different states still found means to counterbalance his successes, and prevent him from enslaving them: so that Milan never became the capital of any extensive empire; and in 1437 Genoa revolted, and was never afterwards reduced.

Philip died in 1448, and by his death the male line of the Visconti family was at an end. The next lawful heir was Valentina his sister, who had married the duke of Orleans son to Charles V. of France. By the contract of that marriage, the lawful progeny of it was to succeed to the duchy of Milan in failure of the heirs-male of the Visconti family; but this succession was disputed by Sforza, who had married Philip's natural daughter. It is certain, however, that the rightful succession was vested in the house of Orleans and the kings of France; and therefore though the Sforza family got possession of the duchy for the present, Louis XII. afterwards put in his claim, as being grandson to John Galeazzo. For some time he was successful; but the French behaved in such an insolent manner, that they were driven out of the Milanese by the Swiss and Maximilian Sforza. The Swiss and Milanese were in their turn expelled by Francis I. who obliged the Sforza family to relinquish the government for a pension of 30,000 ducats a-year. Francis Sforza, the son of Maximilian, however, being assisted by the emperor and the pope, regained the possession of the Milanese about the year 1521; and, eight years after, the French king, by the treaty of Cambray, gave up his claim on the duchy.

But, in fact, the emperors of Germany seem to have had the fairest title to the Milanese in right of their being for a long time sovereigns of Italy. On the death of Francis Sforza, therefore, in the year 1536, the emperor Charles V. declared the Milanese to be an imperial fief, and granted the investiture of it to his son Philip II. king of Spain. In his family it continued till the year 1706, when the French and Spaniards were driven out by the Imperialists, and the emperor again took possession of it as a fief. It was confirmed to his house by the treaty of Baden in 1714, by the quadruple alliance in 1718, and by the treaty of Aix-la Chapelle in 1748.

The duchy of Milan is one of the finest provinces in Italy. It is bounded on the south by the Appennine mountains, and the territory of Genoa; on the north by Switzerland; on the east by the Venetian territories, and the duchies of Mantua, Parma, and Placentia; and on the west by Savoy, Piedmont, and Montferrat; extending from north to south about 100 miles, and from east to west about 108. It is well watered by the Tessino, the Sesia, the Adda, the Po, the Oglio, the Lombro, Serio, &c. and also by several canals and lakes. Of the latter, the Lago Maggiore is between 30 and 40 miles in length, and in some places six or seven miles broad. In it lie the *Boromean Islands*, as they are called, viz. Isola Bella and Isola Madre, the beauty of which almost exceeds imagination: art and nature seem to have vied with one another in embellishing them. In each of them is a palace with delicious gardens, belonging to the

Boromean family: The water of the lake is clear and of a greenish colour, and abounds with fish. The hills with which it is surrounded present a most charming landscape, being planted with vines and chestnut-trees, interspersed with summer-houses. There is a canal running from it towards Switzerland, with which the city of Milan has a communication. It was anciently called *Lacus Verbanus*. The Lago de Como, which was called by the Latin poets *Lacus Larius*, but had its modern name from the city, near which it lies, extends itself about 30 miles northward from Como, but its greatest breadth is not above five miles. From the Lago Maggiore issues the Tessino; and from that of Como the Adda. Of the other lakes, that of Lugano and Guarda are the chief: that of Guarda was anciently called *Benacus*.

The trade and manufactures of this duchy consist principally in silks, stuffs, stockings, gloves, and handkerchiefs, linen and woollen cloth, hardware, curious works of crystal, agate, hyacinths, and other gems; but their exports are usually far short of their imports.

As to the revenue of the duchy, it must without doubt be very considerable. It is said to have amounted to 2,000,000 of dollars while the duchy was in the hands of Spaniards.

In the year 1767, the Austrian government of Milan published a law, by which all the rights which the pope or the bishops had till then exercised over ecclesiastics, either with regard to their effects or persons, is transferred to a council established for that purpose at Milan. By the same edict, all ecclesiastics were obliged to sell the estates which they had become possessed of since the year 1722; and no subject, whether ecclesiastic or secular, was to go to Rome to solicit any favour, except letters of indulgence, without the consent of the said council.

MILAN, the capital of the duchy of that name, in Latin *Mediolanum*, is a very large city, and has a wall and rampart round it, with a citadel; yet is thought to be incapable of making any great resistance. The gardens within the city take up a great deal of ground. In the citadel is a foundery for cannon, and an arsenal furnished with arms for 12,000 men. The governor of it is quite independent of the governor-general of the Milanese, who resides in the city, in a large but old and ill-contrived palace. The yearly income of the governor of Milan is said to be 200,000 guilders. The council belonging to the city is composed of a president and 60 doctors of law, who are all nobles, and independent of the governor-general. Milan hath experienced a great variety of fortune, having been subject sometimes to the French, sometimes to the Spaniards, and sometimes to the Germans. A great number of persons of rank and fortune live in it, especially during the winter. The ladies in France are not allowed more liberty than those of this city: even the austerities of the monastic life are so far mitigated here, that gentlemen have not only the liberty of talking with the nuns, and of rallying and laughing at the grate, but also of joining with them in concerts of music, and of spending whole afternoons in their company. The place where the *beau monde* take the air, either in their coaches or on foot, is the rampart betwixt the Porta Orientale and the Porta Tosa, where it is straight and broad, and extremely pleasant,

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pleasant, being planted with white mulberry-trees, and commanding a prospect on one side of the open country, and on the other of the gardens and vineyards between the ramparts and the city. Milan, which is said to have been built by the Gauls about 200 years after the foundation of Rome, contains a great number of stately edifices, as churches, convents, palaces, and hospitals. The cathedral is a vast pile, all of marble; and though something has been doing for near 400 years towards the outward or inward ornament thereof, it is not yet finished. Of the great number of statues about it, that of St. Bartholomew, just dead alive, with his skin hanging over his shoulders; and of Adam and Eve, over the main portal, are the finest. The pillars supporting the roof of the church are all of marble, and the windows finely painted. This church contains a treasure of great value, particularly a shrine of rock-crystal, in which the body of St. Charles Borromeo is deposited. The other churches most worthy a stranger's notice are those of St. Alexander, St. Jerome, St. Giovanni di Casarotti della Passione, that of the Jesuits, and of St. Ambrose, in which lie the bodies of the saint and of the kings Pepin and Bernard. In the Ambrosian college, founded by Frederic Borromeo, 16 professors teach gratis. In the same college is also an academy of painting, with a museum, and a library containing a vast number of printed books and manuscripts; among the last of which is a translation of Josephus's History of the Jews, done by Rufinus about 1200 years ago, and written on the bark of a tree; St. Ambrose's works on vellum, finely illuminated; the orations of Gregory Nazianzen, and the works of Virgil, in folio, with Petrarch's notes. In the museum are Leonardi da Vinci's mathematical and mechanical drawings, in 12 large volumes. The seminary for sciences, the college of the nobles, the Helvetian college, and the mathematical academy, are noble foundations, and stately buildings. Of the hospitals, the most remarkable are the Lazaretto, and that called the *great hospital*; the latter of which receives sick persons, foundlings, and lunatics, and has six smaller hospitals depending on it, with a revenue of 100,000 rixdollars.

The number of the inhabitants of this city is said to be about 200,000. It has been 40 times besieged, taken 20 times, and four times almost entirely demolished; yet it hath always recovered itself. It is said that gunpowder is sold here only by one person, and in one place. The court of inquisition is held in the Dominican convent, near the church of Madonna della Gracia. The houses of entertainment, and the ordinaries here, are represented as very indifferent. Mr. Keytler says, it is not unusual for young travellers, when they go to any of the taverns in Milan, to be asked, "whether they choose a *letto fornito*, or female bed-fellow," who continues masked till she enters the bed-chamber. Milan is described as inferior to Turin both in beauty and conveniency; many of the streets being crooked and narrow, and paper-windows much more frequent than in that city; even in grand palaces, the windows are often composed promiscuously of glass and paper. Two large canals extend from hence, the one to the Tessino, and the other to the Adda; the Tessino having a communication with the

Lago Maggiore, and, by a canal, with the Sesia; and the Adda issuing from the Lago di Como, and having a communication by canals with the Lambro and Serio. In a void space in one of the streets of Milan, where stood the house of a barber who had conspired with the commissary of health to poison his fellow-citizens, is erected a pillar called *Colonna Infame*, with an inscription to perpetuate the memory of the execrable design. The environs of this city are very pleasant, being adorned with beautiful seats, gardens, orchards, &c. About two Italian miles from it, at the seat of the Simonetti family, is a building, that would have been a master-piece of its kind had the architect designed it for an artificial echo. It will return or repeat the report of a pistol above 60 times; and any single musical instrument, well touched, will have the same effect as a great number of instruments, and produce a most surprising and delightful concert.

According to Dr. Moore, "there is no place in Italy, perhaps in Europe, where strangers are received in such an easy hospitable manner as at Milan. Formerly the Milanese nobility displayed a degree of splendor and magnificence, not only in their entertainments, but in their usual style of living, unknown in any other country in Europe. They are under a necessity at present of living at less expence, but they still show the same obliging and hospitable disposition. This country having, not very long since, been possessed by the French, from whom it devolved to the Spaniards, and from them to the Germans, the troops of those nations have, at different periods, had their residence here, and, in the course of these vicissitudes, produced a style of manners, and stamped a character on the inhabitants of this duchy, different from what prevails in any other part of Italy; and nice observers imagine they perceive in Milanese manners the politeness, formality, and honesty imputed to those three nations, blended with the ingenuity natural to Italians. The great theatre having been burnt to the ground last year, there are no dramatic entertainments, except at a small temporary play-house, which is little frequented; but the company assemble every evening in their carriages on the ramparts, and drive about, in the same manner as at Naples, till it is pretty late. In Italy, the ladies have no notion of quitting their carriages at the public walks, and using their own legs, as in England and France. On seeing the number of servants, and the splendor of the equipages which appear every evening at the Corso on the ramparts, one would not suspect that degree of depopulation, and diminution of wealth, which we are assured has taken place within these few years all over the Milanese; and which proceeds from the burdensome nature of some late taxes, and the insolent and oppressive manner in which they are gathered." E. Long. 15. 35. N. Lat. 38. 32.

MILBORN-PORT, a town of Somersetshire in England, seated on a branch of the river Parret, 115 miles from London. Though it is represented in parliament, is no market-town nor corporation; but it appears in Domesday-book to have had a market once, and 56 burghesses. It is in a manner surrounded by Dorsetshire. Here are nine capital burghesses, who

B 2

yearly

Milan,
Milborn.

Milbrook
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Milw.

yearly choose two bailiffs, that have the government of the borough under them, and jointly return the members to parliament with the two stewards, who are chosen yearly out of nine commonalty stewards, and have the custody of the corporation-seal. These two stewards also distribute the profits of the lands given to the poor here, of which the said commonalty stewards are trustees. The inhabitants are about 1100, the houses not much above 200. There are two fairs, June 6th and October 28th.

MILBROOK, a town of Cornwall, on the west side of Plymouth-Haven. It has a good fishing-trade, and has formerly furnished our fleet with many able hands.

MILDENHALL, a town of Suffolk, seven miles from Newmarket, 12 from Bury, and 70 from London. It is a large populous town on the river Lark, a branch of the Ouse, with a harbour for boats. It has a well-frequented market on Fridays, especially for fish and wild-fowl. Its church has a tower or steeple 120 feet high.

MILDEW, is said to be a kind of thick, clammy, sweet juice, exhaled from, or falling down upon, the leaves and blossoms of plants. By its thickness and clamminess it prevents perspiration, and hinders the growth of the plant. It sometimes rests on the leaves of trees in form of a fatty juice, and sometimes on the ears of corn. It is naturally very tough and viscous, and becomes still more so by the sun's heat exhaling its more fluid parts; by which means the young ears of corn are so daubed over, that they can never arrive at their full growth. Bearded wheat is less subject to the mildew than the common sort; and it is observed that newly-dunged lands are more liable to mildew than others. The best remedy is a smart shower of rain, and immediately afterwards a brisk wind. If the mildew is seen before the sun has much power, it has been recommended to send two men into the field with a long cord, each holding one end; and drawing this along the field through the ears, the dew will be dislodged from them, before the heat of the sun is able to dry it to that viscous state in which it does the mischief. Some also say, that lands which have for many years been subject to mildews, have been cured of it by sowing foot along with the corn, or immediately after it.

Mr J. S. Segar, the author of a treatise upon this subject, observes, that the mildew is of such a sharp corrosive nature, that it raises blisters on the feet of the shepherds who go barefoot, and even consumes the hoofs of the cattle. He suspects that it possesses some arsenical qualities, though he does not pretend to affirm this positively. Its pernicious influence, according to him, is rendered still more powerful by a variety of circumstances; such as sending the cattle into the fields too early in the spring; their drinking water mixed with ice, or but lately thawed; their being kept in stables that are too close and filthy, and which are not sufficiently aired. The same author considers the mildew as a principal cause of epidemical distempers among the cattle. The mildew producing these diseases, he says, is that which dries and burns the grass and leaves. It falls usually in the morning, particularly after a thunder-storm. Its poisonous quality (which does not continue above 24 hours)

never operates but when it has been swallowed immediately after its falling. The disorder attacks the stomach, is accompanied with pimples on the tongue, loss of appetite, a desiccation of the aliments in the stomach, a cough, and difficulty of respiration. As a preservative, the author prescribes purging in spring and in winter. The medicine he advises is composed of 30 grains of sulphur of antimony, and 60 grains of resin of jalap. He is against vomiting, and every thing that is of a heating nature.

MILE, a measure of length or distance, containing eight furlongs. The English statute-mile is 80 chains, or 1760 yards; that is, 5280 feet.

We shall here give a table of the miles in use among the principal nations of Europe, in geometrical paces, 60,000 of which make a degree of the equator.

	Geometrical paces
Mile of Russia	750
of Italy	1000
of England	1200
of Scotland and Ireland	1500
Old league of France	1500
The small league, <i>ibid.</i>	2000
The mean league, <i>ibid.</i>	2500
The great league, <i>ibid.</i>	3000
Mile of Poland	3000
of Spain	3428
of Germany	4000
of Sweden	5000
of Denmark	5000
of Hungary	6000

MILETUS (anc. geog.), a town of Crete mentioned by Homer; but where situated does not appear. It is said to be the mother-town of Miletus in Caria, whither a colony was led by Sarpedon, Minos's brother, (Ephorus, quoted by Strabo). *Milefii*, the people, (Ovid).

MILETUS (anc. geog.), a celebrated town of Asia Minor, on the confines of Ionia and Caria. It was the capital city of all Ionia, and famous both for the arts of war and peace. It was situated about 10 stadia south of the mouth of the river Mæander, near the sea-coast. It was founded by a Cretan colony under Miletus, the companion of Bacchus; or (according to others) by Neleus the son of Codrus; or by Sarpedon a son of Jupiter. It has successively been called *Lelegeis*, *Pithyusa*, and *Anadoria*. The inhabitants, called *Milefii*, were very powerful, and long maintained an obstinate war against the kings of Lydia. They early applied themselves to navigation; and planted no less than 80 colonies, or (according to Seneca) 380, in different parts of the world. It was the only town that made head against Alexander, and with much difficulty taken. It gave birth to Thales, one of the seven wise men, and the first who applied himself to the study of nature. It was also the country of Anaximander, the scholar and successor of Thales, the inventor of sun-dials and the gnomon, and the first that published a geographical map; of Anaximance, scholar and successor to the foregoing; and of other great men. It was noted for its excellent wool, according to Virgil; and was also celebrated for a temple and oracle of Apollo Didymæus. This famous people, from being powerful, becoming

Mile,
Miletus.

Milfoil.
Milford.

becoming afterwards opulent and abandoned to pleasures, lost both their riches and their power.—At present it is called by the Turks *Melas*, and not far distant from it runs the river *Mæander*. St Paul going from Corinth to Jerusalem passed by Miletus, and as he went by sea, and could not take Ephesus in his way, he caused the bishops and priests of the church of Ephesus to come to Miletus (Acts xx. 15. &c.), which was about 12 leagues from them.

MILFOIL, or YARROW. See *ACHI LLEA*.

MILFORD, a town of Suffex-county in the Delaware state, is situated at the source of a small river, 15 miles from Delaware bay, and 150 southward of Philadelphia. This town, which contains about 80 houses, has been built, except one house, since the revolution. It is laid out with much taste, and is by no means disagreeable. The inhabitants are Episcopalians, Quakers, and Methodists.

MILFORD-HAVEN, one of the finest harbours in Europe, and indisputably the best in Britain, is situated in Pembrokeshire in South-Wales, and lies on the north side of the Bristol Channel. It is very large, safe, and deep; there is no danger of going in or out with the tide, or almost with any wind. If a ship comes in without a cable or anchor, she may run ashore on the ooze, and there lie safe till she is refitted; and in an hour's time she may get out of the harbour into the open sea. It lies extremely convenient for ships bound from the English or Bristol Channels to Ireland, or farther west, and from thence to the Channels. It is said, that 1000 sail of any size may ride secure in this haven. It has 16 deep and safe creeks, five bays, and 13 roads, all distinguished by their several names. The spring tide rises 36 feet; so that ships may at any time be laid ashore. Dale harbour is a ready out-let for small vessels, where they may ride in two or three fathoms at low-water.—In the reign of Queen Elizabeth, before the Spanish invasion, two forts were begun at the entrance of Milford-Haven, one on each side, called *Nangle* and *Dale* blockhouses; but they were not then finished.—The Stack-rock rises here above water, lying near the middle of the entrance between Nangle and Dale. Penermouth is the opening of that branch of the haven on which the town of Pembroke is seated, and where the custom-house of Milford is kept. The breadth of the entrance between rock and rock is but 200 yards at high-water, and 112 at low-water. There is a ridge of rocky ground that has the name of *Carrs*, which runs almost across Milford-Haven, from Peterchurch towards Llanstadwell, where it renders the landing-place difficult to strangers, from its not appearing at low-water. The great convenience of this harbour is, that in an hour's time a ship may be in or out of it, and in the way between the Land's-End and Ireland. As it lies near the mouth of the Severn, a ship in eight or ten hours may be over on the coast of Ireland, or off the Land's-End in the English Channel; and a vessel may get out hence to the west much sooner than from either Plymouth or Falmouth. This harbour has been greatly improved by new works, at the expence of the government. The parliament, on April 14. 1759, granted 10,000*l.* for fortifying the harbour of Mil-

ford, all of which was expended on the fort at Neyland, which, however, still remains unfinished.

MILIARY, in general, something resembling millet-seed.

MILIARY-Fever. See *MEDICINE*, n^o 229.

MILITANT, or CHURCH-MILITANT, denotes the body of Christians while here on earth.

MILITARY, something belonging to the soldiery or militia.

MILITARY-Discipline, the training of soldiers, and the due enforcement of the laws and regulations instituted by authority for their conduct.

Next to the forming of troops, military discipline is the first object that presents itself to our notice: it is the soul of all armies; and unless it be established amongst them with great prudence, and supported with unshaken resolution, they are no better than so many contemptible heaps of rabble, which are more dangerous to the very state that maintains them than even its declared enemies.

MILITARY-Execution, the ravaging or destroying of a country or town that refuses to pay the contribution inflicted upon them.

MILITARY-Exercise. See *EXERCISE* and *WORDS of Command*.

MILITARY-State, in British polity, one of the three divisions of the laity. See *LAITY*.

This state includes the whole of the soldiery, or such persons as are peculiarly appointed among the rest of the people for the safeguard and defence of the realm.

In a land of liberty, it is extremely dangerous to make a distinct order of the profession of arms. In absolute monarchies, this is necessary for the safety of the prince; and arises from the main principle of their constitution, which is that of governing by fear: but, in free states, the profession of a soldier, taken singly and merely as a profession, is justly an object of jealousy. In these no man should take up arms but with a view to defend his country and its laws: he puts not off the citizen when he enters the camp; but it is because he is a citizen, and would wish to continue so, that he makes himself for a while a soldier. The laws, therefore, and constitution of these kingdoms, know no such state as that of a perpetual standing soldier, bred up to no other profession than that of war; and it was not till the reign of Henry VII. that the kings of England had so much as a guard about their persons.

In the time of the Anglo-Saxons, as appears from Edward the Confessor's laws, the military force of England was in the hands of the dukes or heretochs, who were constituted through every province and county in the kingdom; being taken out of the principal nobility, and such as were most remarkable for being *sapientes, fideles, et animosi*. Their duty was to lead and regulate the English armies, with a very unlimited power; *prout eis visum fuerit, ad honorem corona et utilitatem regni*. And because of this great power they were elected by the people in their full assembly, or folkmote, in the same manner as sheriffs were elected: following still that old fundamental maxim of the Saxon constitution, that where any officer was entrusted with such power, as, if abused, might

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tend to the oppression of the people, that power was delegated to him by the vote of the people themselves. So too, among the ancient Germans, the ancestors of our Saxon forefathers, they had their dukes, as well as kings, with an independent power over the military, as the kings had over the civil state. The dukes were elective, the kings hereditary: for so only can be consistently understood that passage of Tacitus, *Reges ex nobilitate, duces ex virtute sumunt*. In constituting their kings, the family or blood-royal was regarded; in choosing their dukes or leaders, warlike merit: just as Cesar relates of their ancestors in his time, that whenever they went to war, by way either of attack or defence, they elected leaders to command them. This large share of power, thus conferred by the people, though intended to preserve the liberty of the subject, was perhaps unreasonably detrimental to the prerogative of the crown: and accordingly we find a very ill use made of it by Edric duke of Mercia, in the reign of king Edmond Ironside; who, by his office of duke or heretoch, was intitled to a large command in the king's army, and by his repeated treacheries at last transferred the crown to Canute the Dane.

It seems universally agreed by all historians, that king Alfred first settled a national militia in this kingdom, and by his prudent discipline made all the subjects of his dominions soldiers: but we are unfortunately left in the dark as to the particulars of this his so celebrated regulation; though, from what was last observed, the dukes seem to have been left in possession of too large and independent a power: which enabled duke Harold, on the death of Edward the Confessor, though a stranger to the royal blood, to mount for a short space the throne of this kingdom, in prejudice of Edgar Etheling the rightful heir.

Upon the Norman conquest, the feudal law was introduced here in all its rigour, the whole of which is built on a military plan. In consequence thereof, all the lands in the kingdom were divided into what were called *knight's fees*, in number above 60,000; and for every knight's fee a knight or soldier, *miles*, was bound to attend the king in his wars, for 40 days in a year; in which space of time, before war was reduced to a science, the campaign was generally finished, and a kingdom either conquered or victorious. By this means the king had, without any expence, an army of 60,000 men always ready at his command. And accordingly we find one, among the laws of William the conqueror, which in the king's name commands and firmly enjoins the personal attendance of all knights and others; *quod habeant et teneant se semper in armis et equis, ut decet et oportet: et quod semper sint prompti et parati ad servitium suum integrum nobis explendum et peragendum, cum opus adfuerit, secundum quod debent de feodis et tenementis suis de jure nobis facere*. This personal service in process of time degenerated into pecuniary commutations or aids; and at last the military part of the feudal system was abolished at the Restoration, by statute 12 Car. II. c. 24. See *FEUDAL-System*.

In the meantime, we are not to imagine that the kingdom was left wholly without defence in case of domestic insurrections, or the prospect of foreign invasions. Besides those who by their military tenures

were bound to perform 40 days service in the field, first the assize of arms, enacted 27 Hen. II. and afterwards the statute of Winchester, under Edward I. obliged every man, according to his estate and degree, to provide a determinate quantity of such arms as were then in use, in order to keep the peace; and constables were appointed in all hundreds by the latter statute, to see that such arms were provided. These weapons were changed, by the statute 4 & 5 Ph. & M. c. 2. into others of more modern service; but both this and the former provisions were repealed in the reign of James I. While these continued in force, it was usual from time to time for our princes to issue commissions of array, and send into every county officers in whom they could confide, to muster and array (or set in military order) the inhabitants of every district; and the form of the commission of array was settled in parliament in the 5 Hen. IV. But at the same time it was provided, that no man should be compelled to go out of the kingdom at any rate, nor out of his shire, but in cases of urgent necessity; nor should provide soldiers unless by consent of parliament. About the reign of king Henry VIII. and his children, lord-lieutenants began to be introduced, as standing representatives of the crown, to keep the counties in military order; for we find them mentioned as known officers in the statute 4 & 5 Ph. & M. c. 3. though they had not been then long in use; for Camden speaks of them in the time of Queen Elizabeth as extraordinary magistrates, constituted only in times of difficulty and danger.

In this state things continued till the repeal of the statutes of armour in the reign of king James I.; after which, when king Charles I. had, during his northern expeditions, issued commissions of lieutenancy, and exerted some military powers which, having been long exercised, were thought to belong to the crown, it became a question in the long-parliament, how far the power of the militia did inherently reside in the king; being now unsupported by any statute, and founded only upon immemorial usage. This question, long agitated with great heat and resentment on both sides, became at length the immediate cause of the fatal rupture between the king and his parliament: the two houses not only denying this prerogative of the crown, the legality of which claim perhaps might be somewhat doubtful; but also seizing into their hands the entire power of the militia, the illegality of which step could never be any doubt at all.

Soon after the restoration of king Char. II. when the military tenures were abolished, it was thought proper to ascertain the power of the militia, to recognise the sole right of the crown to govern and command them, and to put the whole into a more regular method of military subordination: and the order in which the militia now stands by law, is principally built upon the statutes which were then enacted. It is true, the two last of them are apparently repealed; but many of their provisions are re-enacted, with the addition of some new regulations, by the present militia-laws; the general scheme of which is to discipline a certain number of the inhabitants of every county, chosen by lot for three years, and officered by the lord-lieutenant, the deputy-lieutenants, and other principal landholders, under a commission from the crown. They are not compellable to march out of their counties, unless

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Military. in case of invasion or actual rebellion, nor in any case compellable to march out of the kingdom: They are to be exercised at stated times: and their discipline in general is liberal and easy; but, when drawn out into actual service, they are subject to the rigours of martial law, as necessary to keep them in order. This is the constitutional security which our laws have provided for the public peace, and for protecting the realm against foreign or domestic violence; and which the statutes declare is essentially necessary to the safety and prosperity of the kingdom.

When the nation was engaged in war, more veteran troops and more regular discipline were esteemed to be necessary, than could be expected from a mere militia; and therefore at such times more rigorous methods were put in use for the raising of armies and the due regulation and discipline of the soldiery: which are to be looked upon only as temporary excrescences bred out of the distemper of the state, and not as any part of the permanent and perpetual laws of the kingdom. For martial law, which is built upon no settled principles, but is entirely arbitrary in its decisions, is, as Sir Matthew Hale observes, in truth and reality no law, but something indulged rather than allowed as a law. The necessity of order and discipline in an army is the only thing which can give it countenance; and therefore it ought not to be permitted in time of peace, when the king's courts are open for all persons to receive justice according to the laws of the land. Wherefore, Thomas earl of Lancaster being convicted at Pontefract, 15 Edw. II. by martial law, his attainder was reversed 1 Edw. III. because it was done in time of peace. And it is laid down, that if a lieutenant, or other, that hath commission of martial authority, doth in time of peace hang or otherwise execute any man by colour of martial law, this is murder; for it is against *magna carta*. And the petition of right enacts, that no soldier shall be quartered on the subject without his own consent; and that no commission shall issue to proceed within this land according to martial law. And whereas, after the Restoration, king Ch. II. kept up about 5000 regular troops, by his own authority, for guards and garrisons; which king James II. by degrees increased to no less than 30,000, all paid from his own civil list; it was made one of the articles of the bill of rights, that the raising or keeping a standing army within the kingdom in time of peace, unless it be with consent of parliament, is against law.

But as the fashion of keeping standing armies (which was first introduced by Charles VII. in France, 1445) has of late years universally prevailed over Europe (tho' some of its potentates, being unable themselves to maintain them, are obliged to have recourse to richer powers, and receive subsidiary pensions for that purpose), it has also for many years past been annually judged necessary by our legislature, for the safety of the kingdom, the defence of the possessions of the crown of Great Britain, and the preservation of the balance of power in Europe, to maintain even in time of peace a standing body of troops, under the command of the crown; who are however *ipso facto* disbanded at the expiration of every year, unless continued by parliament. And it was enacted by statute 10 W. III. c. 1. that not more than 12,000 regular

Military. forces should be kept on foot in Ireland, though paid at the charge of that kingdom: which permission is extended by stat. 8. Geo. III. c. 13. to 16,235 men in time of peace.

To prevent the executive power from being able to oppress, says baron Montesquieu, it is requisite that the armies with which it is entrusted should consist of the people, and have the same spirit with the people; as was the case at Rome, till Marius new-modelled the legions by enlisting the rabble of Italy, and laid the foundation of all the military tyranny that ensued. Nothing then, according to these principles, ought to be more guarded against in a free state, than making the military power, when such a one is necessary to be kept on foot, a body too distinct from the people. Like ours, therefore, it should wholly be composed of natural subjects; it ought only to be enlisted for a short and limited time; the soldiers also should live intermixed with the people; no separate camp, no barracks, no inland fortresses, should be allowed. And perhaps it might be still better, if, by dismissing a stated number, and enlisting others at every renewal of their term, a circulation could be kept up between the army and the people, and the citizen and the soldier be more intimately connected together.

To keep this body of troops in order, an annual act of parliament likewise passes, "to punish mutiny and desertion, and for the better payment of the army and their quarters." This regulates the manner in which they are to be dispersed among the several inn-keepers and victuallers throughout the kingdom; and establishes a law-martial for their government. By this, among other things, it is enacted, that if any officer or soldier shall excite, or join any mutiny, or, knowing of it, shall not give notice to the commanding officer, or shall desert, or list in any other regiment, or sleep upon his post, or leave it before he is relieved, or hold correspondence with a rebel or enemy, or strike or use violence to his superior officer, or shall disobey his lawful commands; such offender shall suffer such punishment as a court-martial shall inflict, though it extend to death itself.

However expedient the most strict regulations may be in time of actual war, yet in times of profound peace, a little relaxation of military rigour would not, one should hope, be productive of much inconvenience. And, upon this principle, though by our standing laws (still remaining in force, though not attended to) desertion in time of war is made felony without benefit of clergy, and the offence is triable by a jury, and before the judges of the common law; yet, by our militia laws beforementioned, a much lighter punishment is inflicted for desertion in time of peace. So, by the Roman law also, desertion in time of war was punished with death, but more mildly in time of tranquillity. But our mutiny-act makes no such distinction: for any of the faults abovementioned are, equally at all times, punishable with death itself, if a court-martial shall think proper. This discretionary power of the court-martial is indeed to be guided by the directions of the crown; which, with regard to military offences, has almost an absolute legislative power. "His Majesty (says the act) may form articles of war, and constitute courts-martial, with power to try any crime by such articles, and inflict such penalties as the articles direct."

Military.

direct." A vast and most important trust! an unlimited power to create crimes, and annex to them any punishments not extending to life or limb! These are indeed forbidden to be inflicted, except for crimes declared to be so punishable by this act; which crimes we have just enumerated, and among which, we may observe, that any disobedience to lawful commands is one. Perhaps in some future revision of this act, which is in many respects hastily penned, it may be thought worthy the wisdom of parliament to ascertain the limits of military subjection, and to enact express articles of war for the government of the army, as is done for the government of the navy; especially as, by our present constitution, the nobility and gentry of the kingdom, who serve their country as militia officers, are annually subjected to the same arbitrary rule during their time of exercise.

One of the greatest advantages of our law is, that not only the crimes themselves which it punishes, but also the penalties which it inflicts, are ascertained and notorious: nothing is left to arbitrary discretion; the king by his judges dispenses what the law has previously ordained, but is not himself the legislator. How much, therefore, is it to be regretted, that a set of men, whose bravery has so often preserved the liberties of their country, should be reduced to a state of servitude in the midst of a nation of freemen; for Sir Edward Coke will inform us, that it is one of the genuine marks of servitude, to have the law, which is our rule of action, either concealed or precarious; *Miseræ est servitus, ubi jus est vagum aut incognitum*. Nor is this state of servitude quite consistent with the maxims of sound policy observed by other free nations. For the greater the general liberty is which any state enjoys, the more cautious has it usually been in introducing slavery in any particular order or profession. These men, as baron Montesquieu observes, seeing the liberty which others possess, and which they themselves are excluded from, are apt (like eunuchs in the eastern seraglios) to live in a state of perpetual envy and hatred towards the rest of the community, and indulge a malignant pleasure in contributing to destroy those privileges to which they can never be admitted. Hence have many free states, by departing from this rule, been endangered by the revolt of their slaves; while, in absolute and despotic governments, where no real liberty exists, and consequently no invidious comparisons can be formed, such incidents are extremely rare. Two precautions are therefore advised to be observed in all prudent and free governments: 1. To prevent the introduction of slavery at all: or, 2. If it be already introduced, not to entrust those slaves with arms, who will then find themselves an overmatch for the freemen. Much less ought the soldiery to be an exception to the people in general, and the only state of servitude in the nation.

But as soldiers, by this annual act, are thus put in a worse condition than any other subjects; so, by the humanity of our standing laws, they are in some cases put in a much better. By statute 43 Eliz. c. 3. a weekly allowance is to be raised in every county for the relief of soldiers that are sick, hurt, and maimed: not forgetting the royal hospital at Chelsea for such as are worn out in their duty. Officers and soldiers, that have been in the king's service, are by several sta-

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tutes, enacted at the close of several wars, at liberty to use any trade or occupation they are fit for, in any town in the kingdom (except the two universities), notwithstanding any statute, custom, or charter to the contrary. And soldiers in actual military service may make nuncupative wills, and dispose of their goods, wages, and other personal chattels, without these forms, solemnities, and expences, which the law requires in other cases. Our law does not indeed extend this privilege so far as the civil law, which carried it to an extreme that borders upon the ridiculous; for if a soldier, in the article of death, wrote any thing in bloody letters on his shield, or in the dust of the field with his sword, it was a very good military testament.

MILITARY Court. See CHIVALRY (*Court of*),

MILITARY Tenures. See TENURE, FEODAL SYSTEM, and KNIGHT.

MILITARY Ways (*viæ militares*), are the large Roman roads which Agrippa procured to be made through the empire, in the time of Augustus, for the more convenient marching of troops and conveyance of carriages. N. Bergier has written the history of the origin, progress, and amazing extent, of these military roads, which were paved from the gates of Rome to the extreme parts of the empire. See WAY.

MILITIA, in general, denotes the body of soldiers, or those who make profession of arms.

In a more restrained sense, militia denotes the trained bands of a town or country, who arm themselves, upon a short warning, for their own defence. So that, in this sense, militia is opposed to regular or stated troops. See *MILITARY State*, and *FEODAL System*.

MILIUM, MILLET, in botany; A genus of the digynia order, belonging to the triandria class of plants; and in the natural method ranking under the 4th order, *Gramina*. The calyx is bivalved, and uniflorous; the corolla is very short; the stigmata pencil like.—There are five species; of which the most remarkable is the panicum, or common millet. This is a native of India, but is now commonly cultivated in many parts of Europe as an esculent grain. It rises, with a reed-like stalk, three or four feet high, and channelled: at every joint there is one reed-like leaf, which is joined on the top of the sheath, and embraces and covers that joint of the stalk below the leaf; this sheath is closely covered with soft hairs, but the leaf which is expanded has none. The top of the stalk is terminated by a large loose panicle, which hangs on one side, having a chaffy flower, which is succeeded by a small round seed. There are two varieties; one with white, and the other with black seeds; but they do not differ in any other particular. This plant is greatly cultivated in the oriental countries, and from whence we are annually furnished with it. It is seldom cultivated in Britain but in small gardens, for feeding of poultry, where the seeds generally ripen very well. It is used as an ingredient in puddings, and is by some people greatly esteemed. The seeds must be sown in the beginning of April, upon a warm dry soil, but not too thick, because the plants divide into several branches, and should have much room. When they come up they should be cleaned from weeds; after which they will

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will in a short time get the better of them, and prevent the future growth. In August the seeds will ripen, when the plant must be cut down, and the seeds beaten out, as is practised for other grain; but if it is not protected from birds, they will devour it as soon as it begins to ripen.

* Lect. on
Mat. Med.

MILK, a well-known fluid, prepared by nature in the breasts of women, and the udders of other animals, for the nourishment of their young.—According to Dr Cullen*, milk is a connecting and intermediate substance between animals and vegetables. It seems immediately to be secreted from the chyle, both being a white liquor of the same consistence: it is most copiously secreted after meals, and of an acescent nature. In most animals who live on vegetables, the milk is acescent; and it is uncertain, though at the same time no observation proves the contrary, whether it is not so likewise in carnivorous animals. But, whatever be in this, it is certain, that the milk of all animals who live on vegetables is acescent. Milk being derived from the chyle, we thence conclude its vegetable nature; for in those who live on both promiscuously, more milk is got, and more quickly, from the vegetable than the animal food. Milk, however, is not purely vegetable; though we have a vegetable liquor that resembles its taste, consistence, colour, acescency, and the separability of the oily part, viz. an emulsion of the nukes oleosæ and farinaceous substances. But these want the coagulable part of milk, which seems to be of animal-nature, approaching to that of the coagulable lymph of the blood. Milk, then, seems to be of an intermediate nature, between chyle taken up from the intestines and the fully elaborated animal-fluid.

Its contents are of three kinds: first, an oily part, which, whatever may be said concerning the origin of other oils in the body, is certainly immediately derived from the oil of the vegetables taken in, as with these it agrees very exactly in its nature, and would entirely if we could separate it fully from the coagulable part. Another mark of their agreement is the separability, which proves that the mixture has been lately attempted, but not fully performed. 2dly, Besides this oily, there is a proper coagulable part: And, 3dly, Much water accompanies both, in which there is dissolved a saline saccharine substance. These three can be got separate in cheese, butter, and whey; but never perfectly so, a part of each being always blended with every other part.

Nothing is more common, from what has been said of its immediate nature, than to suppose that it requires no assimilation; and hence has been deduced the reason of its exhibition in the most weakly state of the human body. But wherever we can examine milk, we always find that it coagulates, suffers a decomposition, and becomes acescent. Again, infants, who feed entirely on milk, are always troubled with eructations, which every body observes are not of the same quality with the food taken; and therefore it appears, that, like all other food, milk turns naturally acescent in the stomach, and only enters the chyle and blood in consequence of a new recombination. It approaches then to the nature of vegetable aliment, but is not capable of its noxious vinous fermentation, and therefore has an advantage over it; neither from this quality, like

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animal-food, is it heating in the stomach, and productive of fever; though at the same time, from its quantity of coagulable matter, it is more flourishing than vegetables.

Milk is the food most universally suited to all ages and states of the body; but it seems chiefly designed by nature as the food of infants. When animals are in the fœtus-state, their solids are a perfect jelly, incapable of an assimilatory power. In such state nature has perfectly assimilated food, as the albumen ovi in the oviparous, and in the viviparous animals certainly somewhat of the same kind, as it was necessary the vessels should be filled with such a fluid as would make way for an after-assimilation. When the infant has attained a considerable degree of firmness, as when it is separated from the mother, yet such a degree of weakness still remains as makes somewhat of the same indication necessary, it behoves the infant to have an alkalescent food ready prepared, and at the same time its noxious tendency to be avoided. Milk then is given, which is alkalescent, and, at the same time, has a sufficient quantity of acidity to correct that alkalescency. As the body advances in growth, and the alkalescent tendency is greater, the animal, to obviate that tendency, is led to take vegetable food, as more suited to its strength of assimilation.

Dr Cullen observes, that milk is almost suited to all temperaments; and it is even so to stomachs disposed to acescency, more than those substances which have undergone the vinous fermentation; nay, it even cures the heart-burn, checks vinous fermentation, and precipitates the lees, when, by renewal of fermentation, the wine happens to be fouled. It therefore very properly accompanies a great deal of vegetable aliment; although sometimes its acescency is troublesome, either from a large proportion taken in, or from the degree of it; for, according to certain unaccountable circumstances, different acids are formed in the stomach in different states of the body; in a healthy body, e. g. a mild one; in the hypochondriac disease, one sometimes as corrosive as the fossil acid. When the acidity of milk is carried to a great degree, it may prove remarkably refrigerent, and occasion cold crudities, and the recurrence of intermittent fevers. To take the common notion of its passing unchanged into the blood, it can suffer no solution. But if we admit its coagulum in the stomach, then it may be reckoned among soluble or insoluble foods, according as that coagulum is more or less tenacious. Formerly rennet, which is employed to coagulate milk, was thought an acid; but, from late observations, it appears, that, if it be an acid, it is very different from other acids, and that its coagulum is stronger than that produced by acids. It has been imagined, that a rennet is to be found in the stomachs of all animals, which causes coagulation of milk; but to Dr Cullen the coagulation of milk seems to be owing to a weak acid in the stomach, the reliëts of our vegetable food, inducing, in healthy persons, a weak and soluble coagulum: but in different stomachs this may be very different, in these becoming heavy and less soluble food, and sometimes even evacuated in a coagulated undissolved state both by stomach and stool.

As milk is acescent, it may be rendered sometimes purgative by mixing with the bile; and some examples

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Milk. of this have been remarked. More commonly, however, it is reckoned among those foods which occasion costiveness.

Hoffman, in his experiments on milk, found that all kinds of it contained much water; and when this was dissipated, found the residuum very different in their solubility. But we must not thence conclude, that the same insolubility takes place in the stomach; for extracts made from vegetables with water are often very insoluble substances, and hardly diffusible through water itself: therefore, in Hoffman's extracts, if we may so call them, of milk, somewhat of the same kind might have appeared; and these substances, which in their natural state were not so, might appear very insoluble. However, we may allow that milk is always somehow insoluble in the intestines, as it is of a drying nature, and as cheese, &c. is very costive. And this effect shows that milk is always coagulated in the stomach: for if it remained fluid, no feces would be produced, whereas sometimes very hard ones are observed. In the blood-vessels, from its animal-nature, it may be considered as nutritious; but when we consider its vegetable contents, and acescency in the primæ viæ, we find that, like animal-food, it does not excite that degree of fever in the time of digestion, and that from its acescency it will resist putrefaction. Hence its use in hectic fevers, which, whatever be their cause, appear only to be exacerbations of natural feverish paroxysms, which occur twice every day, commonly after meals, and at night. To obviate these, therefore, we give such an aliment as produces the least exacerbation of these fevers: and of this nature is milk, on account of its acescent vegetable nature.

There appears also somewhat peculiar to milk, which requires only a small exertion of the animal-powers in order to its assimilation; and besides, in hectic complaints there is wanted an oily, bland food, approaching to the animal-nature; so that on all these accounts milk is a diet peculiarly adapted to them, and, in general, to most convalescents, and to those of inflammatory temperaments. So far of milk in general. We shall now speak of the particular kinds which are in common use.

The milk of women, mares, and asses, agree very much in their qualities, being very dilute, having little solid contents, and, when evaporated to dryness, having these very soluble, containing much saccharine matter, of a very ready acescency, and, when coagulated, their coagulum being tender and easily broke down. From this view they have less oil, and seem to have less coagulable matter than the rest.

The milk of cows, sheep, and goats, agree in opposite qualities to the three just mentioned; but here there is somewhat more of gradation. Cows milk comes nearest to the former milk: goats milk is less fluid, less sweet, less flatulent, has the largest proportion of insoluble part after coagulation, and indeed the largest proportion of coagulable part; its oily and coagulable parts are not spontaneously separable, never throwing out a cream, or allowing butter to be readily extracted from it. Hence the virtues of these milks are obvious, being more nourishing, though at the same time less easily soluble in weak stomachs, than the three first, less acescent than these, and so more rarely laxative, and peculiarly fitted for the diet of conva-

lescents without fever. The three first again are less nourishing, more soluble, more laxative, as more acescent, and adapted to the convalescents with fever.

These qualities, in particular milks, are considerably diversified by different circumstances. First, Different animals, living on the same diet, give a considerably different milk; for there seems to be something in the constitution, abstracting from the aliment, which constitutes a considerable diversity of milk, not only in the same species of animals, but also in the same animal, at different ages, and at different distances after delivery: this applies to the choice of nurses. Secondly, Milk follows the nature of the aliment more than any other juice in the human body, being more or less fluid and dilute, more or less solid and nourishing, in proportion as these qualities are more or less in the aliment. The nature of the aliment differs according to its time of growth, *e. g.* old grafs being always found more nourishing than young. Aliment, too, is always varied according to the season, as that is warm or dry, moist or cloudy.

The milk of each particular kind of animal is fitter for particular purposes, when fed on proper food.—Thus the cow delights in the succulent herbage of the vale: if the sheep be fed there he certainly rots, but on the higher and more dry side of the mountain he feeds pleasantly and healthy; while the goat never stops near the bottom, but ascends to the craggy summit: and certainly the milks of these animals are always best on their proper soil, and that of goats is best on a mountainous country. From a dissertation of Linnæus, we have many observations concerning the diversity of plants on which each animal chooses to feed. All the Swedish plants which could be collected together, were presented alternately to domestic animals, and then it appeared that the goat lived on the greatest variety, and even on many which were poisonous to the rest; that the cow chose the first succulent shoots of the plant, and neglected the fructification; which last was preferred by the goat. Hence may be deduced rules concerning the pasturage of different animals; *e. g.* Farmers find, that, in a pasture which was only fit to feed a certain number of sheep, an equal number of goats may be introduced, while the sheep are no less nourished than before.

It is not easy to assign the difference between milk fresh-drawn and that detained in the open air for some time: but certainly there is some material one, otherwise nature universally would not have directed infants to sucking; and indeed it seems, better than the other, fitted for digestion and nourishment. Physicians have supposed that this depended on the evaporation of some *spt. rectior*: but our author cannot conceive any such, except common water here; and besides, these volatile parts can hardly be nutritious. A more plausible account seems deducible from mixture: milk new-drawn has been but lately mixed, and is exposed to spontaneous separation, a circumstance hurtful to digestion; none of the parts being, by themselves, so easily assimilated as when they are all taken together. Hence, then, milk new-drawn is more intimately blended, and therefore then is most proper to the weakly and infants.

Another difference in the use of milk exposed for some time to the air, is taking it boiled or unboiled.

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Physicians have generally recommended the former; but the reason is not easily assigned. Perhaps it is this: Milk kept for some time exposed to the air has gone so far to a spontaneous separation; whereas the heat thoroughly blends the whole, and hence its resolution is not so easy in the stomach; and thus boiled milk is more coctive than raw, and gives more fæces. Again, when milk is boiled, a considerable quantity of air is detached, as appears from the froth on the surface; and air is the chief instrument of fermentation in bodies; so that after this process it is not liable to acescency: for these reasons it is proper for the robust and vigorous.

Another difference of milk is, according as it is fluid or coagulated. The coagulated is of two kinds, as induced by rennet, or the natural acescency of the milk. The former preparation makes the firmer and less easily soluble coagulum; though, when taken with the whey unseparated, it is less difficult of solution, though more so than any other coagulum in the same case. Many nations use the latter form, which is easier soluble, but very much acescent, and therefore, in point of solution, should be confined to the vigorous, in point of acescency, to those who live on alkalescent food; and in the last case, the Laplanders use it as their chief acescent condiment. From the same considerations it is more cooling, and in its other effects like all other acescent vegetables.

Milk by evaporation yields a sweet saline matter, of which Dr Lewis gives the following proportions:

Twelve ounces of	Left of dry matter	From which water extracted a sweet saline substance amounting to
Cows milk	13 drams.	1½ drams.
Goats milk	12½	1½
Human milk	8	6
Asses milk	8	6

The saline substance extracted from asses milk was white, and sweet as sugar; those of the others brown or yellow, and considerably less sweet; that from cows milk had the least sweetness of any.

On distilling 12 quarts of milk in *balneo marie*, at least nine quarts of pure phlegm were obtained: the liquor which afterwards arose was acidulous, and by degrees grew sensibly more and more acid as the distillation was continued. After this came over a little spirit, and at last an empyreumatic oil. The remaining solid matter adhered to the bottom of the retort, in the form of elegant shining black flowers, which being calcined and elixated yielded a portion of fixed alkaline salt.

Milks set in a warm place, throws up to the surface an unctuous cream, from which, by agitation, the butter is easily separated. The addition of alkaline salts prevents this separation, not (as some have supposed) by absorbing an acid from the milk, but by virtue of their property of intimately uniting oily bodies with watery liquors. Sugar, another grand intermedium betwixt oils and water, has this effect in a greater degree, though that concrete is by no means alkaline, or an absorbent of acids.

The sweet saccharine part of the milk remains dissolved in the whey after the separation of the curd or

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cheesy matter, and may be collected from it in a white crystalline form, by boiling the whey till all remains of the curdled substance have fallen to the bottom; then filtering, evaporating to a due consistence, setting it to shoot, and purifying the crystals by solution in water and a second crystallization. Much has been said of the medicinal virtues of this sugar of milk, but it does not seem to have any considerable ones: It is from cows milk that it has been generally prepared; and the crystals obtained from this kind of milk have but little sweetness.

When milk is suffered to coagulate spontaneously, the whey proves acid, and on standing grows more and more so till the putrefactive state commences. Sour whey is used as an acid, preferably to the directly vegetable or the mineral acids, in some of the chemical arts; as for dissolving iron in order to the staining of linen and leather. This acid was commonly made use of in the bleaching of linen, for dissolving and extracting the earthy particles left in the cloth by the alkaline salts and lime employed for cleansing and whitening it. Butter-milk is preferred to plain four-milk or four-whey: This last is supposed to give the cloth a yellow colour. Dr Home, in his ingenious treatise on this subject, recommends water acidulated with spirit of vitriol (in the proportion of about half an ounce, or at most three quarters of an ounce, to a gallon), as preferable in many respects to the acid of milk, or of the more directly vegetable substances. He observes, that the latter are often difficultly procurable, abound with oleaginous particles, and hasten to corruption; whilst the vitriolic acid is cheap, and pure, and indisposed to putrefy: That milk takes five days to perform its office, whilst the vitriolic acid does it in as many hours, perhaps in as many minutes: That this acid contributes also to whiten the cloth, and does not make it weaker though the cloth be kept in it for months. He finds, that acids as well as alkalies, extract an oily matter from the cloth, and lose their acidity and alkalicity. Since this treatise appeared, the use of four-milk is very generally superseded by oil of vitriol.

It is observable, that asses milk is greatly disposed, on standing for a little time, to become thick and ropy. In the Bressau collection for the year 1720, there is a remarkable account of milk (which probably was that of the ass) grown so thick and tenacious as to be drawn out into long strings, which, when dried, were quite brittle.

New cows milk, suffered to stand for some days on the leaves of butterwort or sun-dew, becomes uniformly thick, slippery, and coherent, and of an agreeable sweet taste, without any separation of its parts. Fresh milk, added to this, is thickened in the same manner, and this successively. In some parts of Sweden, as we are informed in the Swedish Memoirs, milk is thus prepared for food.

New milk has a degree of glutinous quality, so as to be used for joining broken stone-ware. There is a far greater tenacity in cheese properly prepared.

Milk, when examined by a microscope, appears composed of numerous globules swimming in a transparent fluid. It boils in nearly the same degree of heat with common water; some sorts rather sooner, and some a little later: after boiling, it is less dis-

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posed to grow sour than in its natural state. It is coagulated by acids both mineral and vegetable, and by alkalies both fixed and volatile. The coagulum made by acids falls to the bottom of the serum; that made by alkalies swims on the surface, commonly forming (especially with volatile alkalies) a thick coriaceous skin. The serum, with alkalies, proves green or fawnous; with acids, it differs little in appearance from the whey that separates spontaneously. The coagulum formed by acids is dissolved by alkalies, and that formed by alkalies is redissolved by acids; but the milk does not in either case resume its original properties. It is coagulated by most of the middle salts, whose basis is an earth or a metallic body; as solution of alum, fixed sal ammoniac, sugar of lead, green and blue vitriol; but not by the chalybeate or purging mineral waters, nor by the bitter salt extracted from the purging waters. Among the neutral salts that have been tried, there is not one that produces any coagulation. They all dilute the milk, and make it less disposed to coagulate with acids or alkalies: Nitre seems to have this effect in a greater degree than the other neutral salts. It is instantly coagulated by highly-rectified spirit of wine, but scarcely by a phlegmatic spirit. It does not mingle with expressed oils. All the coagula are dissolved by gall.

It has generally been supposed by medical authors, that the milk of animals is of the same nature with chyle, and that the human milk always coagulates on the stomach of infants; but in a late dissertation upon the subject by Mr Clarke, member of the royal Irish academy, we find both these positions controverted. According to him, woman's milk, in a healthy state, contains no coagulable, mucilaginous, or cheesy principle, in its composition; or it contains so little, that it cannot admit of any sensible proof. Dr Rutty states, that it does not afford even a sixth part of the curd which is yielded by cows milk; and Dr Young denies that it is at all coagulable either by rennets or acids. This is confirmed by Dr Ferris, who in 1782 gained the Harveian prize-medal at Edinburgh by a dissertation upon milk. Mr Clarke informs us, that he has made a vast number of experiments upon woman's milk with a view to determine this point. He made use of ardent spirits, all the different acids, infusions of infants stomachs, and procured the milk of a great many different women; but in no instance, excepting one or two, did he perceive any thing like curd. This took place in consequence of a spontaneous acescency; and only a small quantity of soft flaky matter was formed, which floated in the serum. This he looked upon to be a morbid appearance.

The general opinion that woman's milk is coagulable, has arisen from a single circumstance, viz. that infants frequently vomit the milk they suck in a state of apparent coagulation. This greatly perplexed Dr Young; who, after having tried in vain to coagulate human milk artificially, concluded, that the process took place spontaneously in the stomach; and that it would always do so if the milk were allowed to remain in a degree of heat equal to about 96 degrees of Fahrenheit. Mr Clarke took equal quantities of three different kinds of milk, and put them into bottles slightly corked, and these bottles into water, the temperature of which was kept up by a spirit-of-wine

lamp as near as possible to 96° of Fahrenheit: but after frequently examining each bottle during the course of the experiment, at the expiration of several hours there was not the smallest tendency towards coagulation to be perceived in any of them; the cream was only thrown to the surface in a thick and adhesive form, and entirely separated from the fluid below, which had something of a grey and wheyish appearance. As the matter vomited by infants is sometimes more adhesive than we can suppose cream to be, Mr Clarke supposed that the curd might be so entangled with the cream, as to be with difficulty separated from it; but having collected a quantity of rich cream from the milk of different women, he repeated the experiment with precisely the same event, not being able in any one instance to produce the smallest quantity of curd. To determine, however, what effects might be produced upon milk by the stomach of an infant, Mr Clarke made the following experiment: Having taken out the stomach of a foetus which had been deprived of life by the use of instruments, he infused it in a small quantity of hot water, so as to make a strong infusion. He added a tea-spoonful of this infusion to equal quantities of cows and human milk; the consequence of which was, that the cow's milk was firmly coagulated in a short time, but the human milk was not altered in the least; neither was the least coagulation produced by adding a second and third spoonful to the human milk. "Upon the whole, then, (says Mr Clarke), I am persuaded it will be found, that human milk, in an healthy state, contains little or no curd, and that the general opinion of its nature and properties is founded upon fallacious analogy and superficial observations made on the matter vomited by infants. We may presume, that the cream of woman's milk, by its inferior specific gravity, will swim on the surface of the contents of the stomach; and being of an oily nature, that it will be of more difficult digestion than any other constituent part of milk. When an infant then sucks very plentifully, so as to over-distend the stomach, or labours under any weakness in the powers of digestion, it cannot appear unreasonable to suppose, that the cream shall be first rejected by vomiting. Analogous to this, we know that adults affected with dyspepsia often bring up greasy fluids from the stomach by eructation, and this especially after eating fat meat. We have, in some instances, known this to blaze when thrown into the fire like spirit of wine or oil." Our author derives a confirmation of his opinion from the following observation, viz. that curds vomited by infants of a few days old are yellow, while they become white in a fortnight or three weeks. This he accounts for from the yellow colour of the cream thrown up by the milk of women during the first four or five days after delivery.

Mr Clarke likewise controverts that common opinion of the human milk being so prone to acidity, that a great number of the diseases of children are to be accounted for from that principle. "Whoever (says he) takes the trouble of attentively comparing human milk with that of ruminant animals, will soon find it to be much less prone to run into the acedent or acid process. I have very often exposed equal quantities of human and cows milk in degrees of temperature, varying from the common summer heat, or 65° to 100°; and

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and I have constantly found that cows milk acquires a greater degree of acidity in 36 hours than the human did in many days: cows milk becomes offensively putrid in four or five days; a change which healthy human milk, exposed in the same manner, will not undergo many weeks, nay sometimes in many months. I once kept a few ounces of a nurse's milk, delivered about six or seven days, for more than two years in a bottle moderately corked. It stood on the chimney-piece, and was frequently opened to be examined. At the end of this period it showed evident marks of moderate acidity, whether examined by the taste, smell, or paper stained by vegetable blues or purples; the latter it changed to a florid red colour, whereas cows milk kept a few days changed the colour of the same paper to a green, thereby clearly showing its putrescent tendency."

Our author next goes on to consider of the probability there is of milk becoming so frequently and strongly acid as to occasion most of the diseases of infants. He begins with an attempt to show, that the phenomena commonly looked upon to be indications of acrimony are by no means certain. Curdled milk has already been shown to be no sign of acidity; and the other appearance, which has commonly been thought to be so certain, viz. green fæces, is, in the opinion of Mr Clarke, equally fallacious. In support of this he quotes a letter from Dr Sydenham to Dr Cole; in which he says that the green matter vomited by hysterical women is not any proof of acrid humours being the cause of that disease, for sea-sick people do the same. The opinion of green fæces being an effect of acidity, proceeds on the supposition that a mixture of bile with an acid produces a green colour; but it is found, that the vegetable acid, which only can exist in the human body, is unable to produce this change of colour, though it can be effected by the strong mineral acids. As nothing equivalent to any of these acids can be supposed to exist in the bowels of infants, we must therefore take some other method of accounting for the green fæces frequently evacuated by them. "Why should sour milk, granting its existence, give rise to them in infants and not in adults? Have butter milk, summer-fruits of the most acedent kind, lemon or orange juice, always this effect in adults by their admixture with bile? This is a question which, I believe, cannot be answered in the affirmative."

On the whole, Dr Clarke considers the disease of acidity in the bowels, though so frequently mentioned, to be by no means common. He owns, indeed, that it may sometimes occur in infancy as well as in adults, from weakness of the stomach, costiveness, or improper food; and an indubitable evidence is afforded by fæces which stain the blue or purple colour of vegetables to a red, though nothing can be inferred with certainty from the colour or smell.

The Doctor next proceeds to state several reasons for his opinion, that the greater number of infantile diseases are not owing to acidity: 1. Woman's milk in an healthy state contains little or no coagulable matter or curd. 2. It shows less tendency out of the body to become acedent than many other kinds of milk. 3. The appearances which have been generally supposed to characterise its acidity do not afford satisfactory evidence of such a morbid cause. 4. Granting

this to be the case, we have plenty of mild absorbents, capable of destroying all the acid which can be supposed to be generated in the bowels of an infant; yet many children are observed to die in consequence of these diseases supposed to arise from acidity. 5. Tho' the milk of all ruminant animals is of a much more acedent nature than that of the human species, yet the young of these animals never suffer any thing like the diseases attributed to acidity in infants. 7. History informs us, that whole nations use four curdled milk as a considerable part of their food without feeling any inconvenience; which, however, must have been the case, if acidity in the stomach were productive of such deleterious effects as has been supposed.

The reasoning of Dr Clarke seems here to be very plausible, and nothing has as yet been offered to contradict it. The reviewers in taking notice of the treatise only observe, that the Doctor's positions are supported by great probability; yet "they have seen them, or think they have seen them, contradicted by the appearance of diseases and the effects of medicines;" so that they must leave the subject to farther examination.

In a memoir by Messrs Parmentier and Deyeux, members of the royal college of pharmacy, &c. in Paris, we have a great number of experiments on the milk of asses, cows, goats, sheep, and mares, as well as women. The experiments on cows milk were made with a view to determine whether any change was made in the milk by the different kinds of food eaten by the animal. For this purpose some were fed with the leaves of *mais* or Turkey wheat; some with cabbage; others with small potatoes; and others with common grass. The milk of those fed with the *mais* or Turkey wheat was extremely sweet; that from the potatoes and common grass much more serous and insipid; and that from the cabbages the most disagreeable of all. By distillation only eight ounces of a colourless fluid were obtained from as many pounds of each of these milks; which from those who fed upon grass had an aromatic flavour; a disagreeable one from cabbage; and none at all from the potatoes and Turkey wheat. This liquid became fetid in the space of a month whatever substance the animal had been fed with, acquiring at the same time a viscosity and becoming turbid; that from cabbage generally, but not always, becoming first putrid. All of them separated a filamentous matter, and became clear on being exposed to the heat of 25° of Reaumur's thermometer. In the residuums of the distillations no difference whatever could be perceived. As the only difference therefore existing in cow's milk lies in the volatile part, our authors conclude, that it is improper to boil milk either for common or medicinal purposes. They observed also, that any sudden change of food, even from a worse to a better kind, was attended by a very remarkable diminution in the quantity of milk. All the residuums of the distillations yielded, in a strong fire, a yellow oil, an acid, a thick and black empyreumatic oil, a volatile alkali, and towards the end a quantity of inflammable air, and at last a coal remained containing some fixed alkali with muriatic acid.

On agitating, in long bottles, the creams from the milk of cows fed with different substances, all of them

Milk.

Milk.

were formed into a kind of half-made butter; of which that formed from the milk from mais was white, firm, and insipid; that from potatoes was softer and more pinguedinous; but that from common grass was the best of all. Cabbage, as in other cases, gave a strong taste.

In the course of their experiments, it was endeavoured to determine whether butter is actually contained in the cream, or whether it be a chemical production of the operation of churning. They could not find any reason absolutely satisfactory on either side, but incline to the latter opinion; because when cream is allowed to remain among the milk, and the whole curdled promiscuously, only fat cheese, without any butter, is produced. The oily parts cannot be separated into butter either by acids or any other means than churning: even the artificial mixture of oil with the cream is insufficient for the purpose.

The serum of milk was reduced by filtration to a clear and pellucid liquor; and, by mixture with fixed alkali, deposited a portion of cheesy matter which had been dissolved in the whey. The sugar of milk was also found in this liquor.

In their experiments upon the milk of various animals, it was found that the milk of asses yielded by distillation an insipid liquor, and deposited a liquor similar to the lymph of cows milk. It is coagulated by all the acids, but not into an uniform mass, exhibiting only the appearance of distinct flocculi. It affords but little cream, which is converted with difficulty into a soft butter that soon becomes rancid. It has but a small quantity of saccharine particles, and these are often mixed with muriatic selenite and common salt. Goats milk has a thick cream, and agreeable to the taste; and the milk itself may be preserved longer in a sound state than any other species, the scum on its surface being naturally convertible into palatable cheese. It is easily made into firm butter, which does not soon become rancid, and has a good flavour. The butter-milk contains a large quantity of cheesy matter which readily coagulates; but has still less saccharine matter than that of asses. Sheeps milk can scarce be distinguished from that of a cow, and easily parts with its cream by standing. It is of a yellow colour, an agreeable flavour, and yields a great proportion of butter; but this is not solid, and soon becomes rancid. Mare's milk is the most insipid and least nutritious of any; notwithstanding which it has been much recommended for weak and consumptive patients: in which cases it is probable that it proves efficacious by being more consonant than any other to the debilitated powers of digestion. It boils with a smaller fire than any other kind of milk, is easily coagulated, and the distilled water does not soon change its nature. It has but a small quantity of cheesy matter, and very few oily particles: the cream cannot be made into butter; and the whey contains about as much sugar as cows or goats milk.

In this memoir our authors remark, that in order to augment the quantity, as well as to improve the quality, of the milk of animals, they should be well fed, their stalls kept clean, and their litter frequently renewed: they should be milked at stated hours, but not drained: great attention should also be paid to the breed; because inferior cattle are maintained at as

great expence as the most valuable kinds. No change ought to be made in the food; though if the milk be employed for medicinal purposes, it may be improved by a proper mixture of herbs, &c.

In their experiments on woman's milk, Messrs Parmentier and Deyeux differ somewhat from Dr Clarke. They first tried the milk of a woman who had been delivered four months; and observed, that after the cream had been separated the other part appeared of a more perfect white, and that it could not be coagulated either by vinegar or mineral acids; which they attributed to a superabundance of serum. But they found that in proportion to the age of the milk it was found to be more easily coagulable; and this was confirmed by experiments made upon the milk of 20 nurses. Its coagulability was not increased by heat. The cream, by agitation, formed a viscid unctuous matter, but could not be changed into perfect butter: but they found that it was extremely difficult to determine the proportions of the various component parts in human milk, as it differs remarkably, not only in different subjects, but in the same subject at different times. In a nurse aged about 32 years, who was extremely subject to nervous affections, the milk was one day found almost quite colourless and transparent. In two hours after, a second quantity drawn from the breast was viscid like the white of an egg. It became whiter in a short time, but did not recover its natural colour before the evening. It was afterwards found that these changes were occasioned by her having some violent hysteric fits in the mean time.

Sugar of Milk. Under the article CHEMISTRY an account has been given of the sugar of milk, with some of the different methods of making it: but of late we have an account of a method used by some of the Tartar nations of preserving their milk by means of frost; in which operation great quantities of the sugar of milk are accidentally formed. The account was given by Mr Fahrigr of Petersburg, who undertook a journey, by order of the academy of Petersburg, among the Mogul tribes who inhabit the country beyond the lake Baikal, on the banks of the river Salenga. These people allow their milk to freeze in large quantity in iron kettles; and, when it is perfectly congealed, they place them over a gentle fire to soften the edges of the cake, after which it may be taken out with a wooden spatula. They commence these operations at the beginning of the cold, when they have milk in the greatest abundance; after which it may be preserved with great ease throughout the whole winter. Mr Fahrigr having frequent opportunities of seeing these cakes, soon observed, that the surface of them was covered to a considerable depth with a farinaceous powder; and having established a dairy upon the same plan with those of the Moguls, he found the same thing take place with himself. This powder was extremely sweet, and he received platefuls of it from the natives, who used it in their food, and sweetened their other victuals with it. Having caused a number of cakes of frozen milk to be conveyed to the top of his house, where they were directly exposed to the violent cold, he found that the separation of the saccharine powder was greatly promoted by this means. He scraped the cakes every week to the depth

Milk.

Milk.

depth of two inches, and afterwards spread out the powder upon an earthen plate in order to destroy the remains of moisture which might have prevented it from keeping for any length of time. When exposed in this manner it had a very agreeable and strong saccharine taste; dissolved in warm water; and when strongly stirred by means of a chocolate-stick, would at all times produce an excellent and well-tasted milk. Raw milk affords a much larger quantity of this saccharine matter than such as has been boiled, or which has had the cream taken off it. Neither must the milk be suddenly exposed to the cold before it has lost its natural heat; for the sudden contact of the cold drives all the cheesy and fat part towards the middle, while the external parts consist of little else than water. In order to allow the parts of the milk to be all properly mixed together, Mr Fahrig allowed the milk when newly taken from the cows to cool, and then poured it out into shallow kettles.

Our author is of opinion that this method of making milk would be of great service to navigators to supply themselves with milk during long sea-voyages: and he assures us, from his own experience, that it will always succeed, if proper attention be paid to it. He is of opinion, however, that all countries are not equally proper for the preparation of this saccharine matter: and indeed this seems very evidently to be the case, as the process appears to be a crystallization of the saccharine parts of the milk, and a separation of them from the aqueous ones by means of extreme cold. The country in which he made the experiments is one of the most elevated in all Asia; and so cold, that, though it lies only in the 50th degree of north latitude, its rivers are frozen up for six months of the year. A very dry cold wind also prevails throughout almost the whole year; and the dry winds generally come from the north, being almost always preceded by a warm wind from the south, which blows for some time. The dry rarefied air increases the evaporation from the ice-cakes, and leaves nothing but the saccharine or pure constituent parts of the milk, which with the addition of water can always recompose the fluid.

MILK, in the wine-trade. The coopers know very well the use of skimmed milk, which makes an innocent and efficacious forcing for the fining down of all white wines, arracks, and small spirits; but is by no means to be used for red wines, because it discharges their colour. Thus, if a few quarts of well-skimmed milk be put to a hoghead of red-wine, it will soon precipitate the greater part of the colour, and leave the whole nearly white; and this is of known use in the turning red wines, when pricked, into white; in which a small degree of acidity is not so much perceived.

Milk is, from this quality of discharging colour from wines, of use also to the wine-coopers, for the whitening of wines that have acquired a brown colour from the cask, or from having been hastily boiled before fermenting; for the addition of a little skimmed milk, in these cases, precipitates the brown colour, and leaves the wines almost limpid, or of what they call a *water whiteness*, which is much coveted abroad in wines as well as in brandies.

Milk of Lime; Milk of Sulphur. The name of *milk*

is given to substances very different from *milk* properly so called, and which resemble milk only in colour. Such is water in which quicklime has been slaked, which acquires a whiteness from the small particles of the lime being suspended in it, and has hence been called the *milk of lime*. Such also is the solution of liver of *sulphur*, when an acid is mixed with it, by which white particles of sulphur are made to float in the liquor.

Milk of Vegetables. For the same reason that milk of animals may be considered as a true animal emulsion, the emulsive liquors of vegetables may be called *vegetable milks*. Accordingly emulsions made with almonds are commonly called *milk of almonds*. But besides this vegetable milk, which is in some measure artificial, many plants and trees contain naturally a large quantity of emulsive or milky juices. Such are lettuce, spurge, fig-tree, and the tree which furnishes the elastic American resin. The milky juices obtained from all these vegetables derive their whiteness from an oily matter, mixed and undissolved in a watery or mucilaginous liquor. Most resinous gums were originally such milky juices, which afterwards become solid by the evaporation of their most fluid and volatile parts.

These natural milky juices have not been examined by any chemist. Such an examination would, however, procure much essential knowledge concerning vegetable economy. We should probably find examples of all kinds of oils reduced into milky juices; and this knowledge cannot fail of throwing much light on the nature of resins and gum-resins.

Milk-Fever. See MIDWIFERY, p. 806.

MILKY-Hedge, the English name of a shrub growing on the coast of Coromandel, where it is used for hedging. The whole shrub grows very bushy with numerous erect branches, which are composed of cylindrical joints as thick as a tobacco-pipe, of a green colour, and from three to six inches long: the joints are thicker than the other parts, but always give way first on any accidental violence offered to the plant. When broken it yields a milk of an excessively caustic quality, which blisters any part of the skin it touches. When the joints are broken off at each end, the tube then contains but very little milk. In this state Mr Ives ventured to touch it with his tongue, and found it a little sweet. In the hedges it is seldom very woody; but when it is, the wood is pretty solid, and the bark grey and cracked. This plant, he informs us, has acquired a great reputation in curing the venereal disease, on the following account. A poor Portuguese woman, the oldest female of her family, had wrought surprising cures in the most inveterate venereal disorders, even such as the European physicians had pronounced incurable. These facts became so notorious, that the servants of the company, and especially their surgeons, were induced to offer her a very considerable premium for a discovery of the medicine; but she always refused to comply, giving for a reason, that while it remained a secret, it was a certain provision for the maintenance of the family in the present as well as in future generations. On account of this denial the English surgeons were sometimes at the pains to have her motions without doors carefully watched; and, as they were not able to discover that she ever gathered of any other plant or tree but this, they conjectured

Milk.

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Milky-way
Mill.

Mill.

tured that the milk of this tree was the specific employed. Mr Ives inquired at the black doctors concerning the virtues of this plant; who all agreed, that it will cure the lues venerea, but differed as to the manner of administering it; some saying that a joint of it should be eaten every morning; others that the milk only should be dropped upon sugar; and then put into milk, oil, &c. and given daily to the patient.

MILKY-Way. See ASTRONOMY-Index.

MILL, a machine for grinding corn, &c. of which there are various kinds, according to the different methods of applying the moving power; as water-mills, wind-mills, mills worked by horses, &c. See MECHANICS, Sect. V.

The first obvious method of reducing corn into flour for bread would be, by the simple expedient of pounding. And that was for ages the only one which was practised by the various descendants of Adam, and actually continued in use among the Romans below the reign of Vespasian. But the process was very early improved by the application of a grinding power, and the introduction of mill-stones. This, like most of the common refinements in domestic life, was probably the invention of the antediluvian world, and certainly practised in some of the earliest ages after it. And, like most of them, it was equally known in the east and west. Hence the Gauls and Britons appear familiarly acquainted with the use of hand-mills before the time of their submission to the Romans; the Britons particularly distinguishing them, as the Highlanders and we distinguish them at present, by the simple appellations of *querns*, *carnes*, or *stones*. And to these the Romans added the very useful invention of water-mills. For this discovery the world is pretty certainly indebted to the genius of Italy; and the machine was not uncommon in the country at the conquest of Lancashire. This, therefore, the Romans would necessarily introduce with their many other refinements among us. And that they actually did, the British appellation of a *water-mill* fully suggests of itself; the *melin* of the Welsh and Cornish, the *mull*, *meill*, and *melin* of the Armoricans, and the Irish *muilean* and *muilind*, being all evidently derived from the Roman *mola* and *molendinum*. The subject Britons universally adopted the Roman name, but applied it, as we their successors do, only to the Roman mill; and one of these was probably erected at every stationary city in the kingdom. One plainly

Whitaker's
History of
Manchester.

was at Manchester, serving equally the purposes of the town and the accommodation of the garrison. And one alone would be sufficient, as the use of hand-mills remained very common in both, many having been found about the site of the station particularly; and the general practice having descended among us nearly to the present period. Such it would be peculiarly necessary to have in the camp, that the garrison might be provided against a siege. And the water-mill at Manchester was fixed immediately below the Castle-field and the town, and on the channel of the Medlock. There, a little above the ancient ford, the sluice of it was accidentally discovered about 30 years ago. On the margin of Dyer's-croft, and opposite to some new constructions, the current of the river, accidentally swelled with the rains, and, obstructed by a dam, broke

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down the northern bank, swept away a large oak upon the edge of it, and disclosed a long tunnel in the rock below. This has been since laid open in part with a spade. It appeared entirely uncovered at the top, was about a yard in width, and another in depth, but gradually narrowed to the bottom. The sides showed every where the marks of the tool on the rock, and the course of it was parallel with the channel. It was bared by the flood about 25 yards only in length, but was evidently continued for several further; having originally begun, as the nature of the ground evinces, just above the large curve in the channel of the Medlock.

For the first five or six centuries of the Roman state, there were no public bread-bakers in the city of Rome. They were first introduced into it from the east, at the conclusion of the war with Perseus, and about the year 167 before Christ. And, towards the close of the first century, the Roman families were supplied by them every morning with fresh loaves for breakfast. But the same custom, which prevailed originally among the Romans and many other nations, has continued nearly to the present time among the Mancunians. The providing of bread for every family was left entirely to the attention of the women in it. And it was baked upon stones, which the Welsh denominate *greiddols* and we *gredles*. It appears, however, from the kiln-burnt pottery which has been discovered in the British sepulchres, and from the British appellation of an *odyn* or *oven* remaining among us at present, that furnaces for baking were generally known among the original Britons. An *odyn* would, therefore, be erected at the mansion of each British baron, for the use of himself and his retainers. And, when he and they removed into the vicinity of a Roman station, the oven would be rebuilt with the mansion, and the public bakehouses of our towns commence at the first foundation of them. One bakehouse would be constructed, as we have previously shown one mill to have been set up, for the public service of all the Mancunian families. One oven and one mill appear to have been equally established in the town. And the inhabitants of it appear immemorably accustomed to bake at the one and grind at the other. Both, therefore, were in all probability constructed at the first introduction of water-mills and ovens into the country. The great similarity of the appointments refers the consideration directly to one and the same origin for them. And the general nature of all such institutions points immediately to the first and actual introduction of both. And, as the same establishments prevailed equally in other parts of the north, and pretty certainly obtained over all the extent of Roman Britain, the same erections were as certainly made at every stationary town in the kingdom.

MILL (John), a very learned divine, was born at Shap in Westmoreland, about the year 1645; and became a servitor of Queen's college Oxford. On his entering into orders he became an eminent preacher, and was made prebendary of Exeter. In 1681, he was created doctor of divinity; about the same time he was made chaplain in ordinary to King Charles II. and in 1685 he was elected principal of St Edmund's hall in Oxford. His edition of the Greek Testament, which will ever render his name memorable, was published about a fortnight before his death, which happened

Mill
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Millener.

pened in June 1707. Dr Mills was employed 30 years in preparing this edition.

MILL-STONE, the stone by which corn is ground. —The mill-stones which we find preserved from ancient times are all small, and very different from those in use at present. Thoresby mentions two or three such found in England, among other Roman antiquities, which were but 20 inches broad; and there is great reason to believe that the Romans, as well as the Egyptians of old, and the ancient Jews, did not employ horses, or wind, or water, as we do, to turn their mills, but made their slaves and captives of war do this laborious work: they were in this service placed behind these mill-stones, and pushed them on with all their force. Sampson, when a prisoner to the Philistines, was treated no better, but was condemned to the mill-stone in his prison. The runner or loose mill-stone, in this sort of grinding, was usually very heavy for its size, being as thick as broad. This is the mill-stone which is expressly prohibited in scripture to take in pledge, as lying loose it was more easily removed. The Talmudists have a story, that the Chaldeans made the young men of the captivity carry mill-stones with them to Babylon, where there seems to have been a scarcity at that time; and hence, probably, their paraphrase renders the text “have borne the mills, or mill-stones;” which might thus be true in a literal sense. They have also a proverbial expression of a man with a mill-stone about his neck; which they use to express a man under the severest weight of affliction. This also plainly refers to this small sort of stones.

Rhenish MILL-Stone, is classed by Cronstedt among the volcanic products, on account of its appearance, which is a blackish grey, porous, and perfectly resembling a lava of Mount Vesuvius.

MILLENARIANS, or **CHILIASTS**, a name given to those, in the primitive ages, who believed that the saints will reign on earth with Christ 1000 years. See **MILLENIUM**.

MILLENER, or **MILLINER**, one who sells ribbands and dresses, particularly head-dresses, for women; and who makes up those dresses.

Of this word different etymologies have been given. It is not derived from the French; for, through some strange fatality, the French cannot express the notion of *millener*, otherwise than by the circumlocution *marchand* or *marchande des modes*.

Neither is it derived from the Low-Dutch language, the great, but neglected, magazine of the Anglo-Saxon. For Sewell, in his Dictionary English and Dutch, 1708, describes *millener* to be “en kraamer van lint en andere optonifelon, Fransche kraamer;” that is, “a pedlar who sells ribbons and other trimmings or ornaments; a French pedlar.”

Littleton, in his English and Latin dictionary, published 1677, defines millener, “a jack of all trades;” q. d. *millenarius*, or *mille mercium venditor*; that is, “one who sells a thousand different sorts of things.” This etymology seems fanciful: But, if he rightly understood the vulgar meaning of the word *millener* in his time, we must hold that it then implied what is now termed “a haberdasher of small wares,” one who dealt in various articles of petty merchandise, and who did not make up the goods which he sold.

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Before Littleton's time, however, a somewhat nicer characteristic than seems compatible with his notion, appears to have belonged to them; for Shakespeare, in his Henry IV. makes Hotspur, when complaining of the daintiness of a courtier, say,

“He was *perfumed* like a millener.”

The fact seems to be, that there were milleners of several kinds: as, *horse-milleners*, (for so those persons were called who make ornaments of coloured worsted for horses); haberdashers of small wares, the *milleners* of Littleton; and *milleners* such as those now peculiarly known by that name, whether male or female, and to whom Shakespeare's allusion seems most appropriate.

Lastly, Dr Johnson, in his Dictionary, derives the word from *milaner*, an inhabitant of *Milan*, from whence people of this profession first came, as a *Lombard* is a banker.

MILLE PASSUS, or *Millia Passuum*; a very common expression among the ancient Romans for a measure of distance, commonly called a *mile*. *Milliarium*, rarely used. Which Hesychius made to consist of seven stadia; Plutarch, little short of eight; but many others, as Strabo and Polybius, make it just eight stadia. The reason of this difference seems to be, that the former had a regard to the Grecian foot, which is greater than the Roman or Italic. This distance is oftentimes called *lapis*, which see. Each passus consisted of five feet, (Columella).

MILLENIUM, “a thousand years;” generally employed to denote the thousand years, during which, according to an ancient tradition in the church, grounded on some doubtful texts in the Apocalypse and other scriptures, our blessed Saviour shall reign with the faithful upon earth after the first resurrection, before the final completion of beatitude.

Though there has been no age of the church in which the millenium was not admitted by individual divines of the first eminence, it is yet evident from the writings of Eusebius, Irenæus, Origen, and others among the ancients, as well as from the histories of Dupin, Mosheim, and all the moderns, that it was never adopted by the whole church, or made an article of the established creed in any nation.

About the middle of the fourth century the millenians held the following tenets:

1st, That the city of Jerusalem should be rebuilt, and that the land of Judea should be the habitation of those who were to reign on earth 1000 years.

2^{dly}, That the first resurrection was not to be confined to the martyrs; but that after the fall of Antichrist all the just were to rise, and all that were on the earth were to continue for that space of time.

3^{dly}, That Christ shall then come down from heaven, and be seen on earth, and reign there with his servants.

4^{thly}, That the saints during this period shall enjoy all the delights of a terrestrial paradise.

These opinions were founded upon several passages of scripture, which the millenarians among the fathers understood in no other than a literal sense, but which the moderns, who hold that opinion, consider as partly literal and partly metaphorical. Of these passages, that upon which the greatest stress has been laid, we believe to be the following:—“And I saw an angel come down from heaven, having the

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Millenium. key of the bottomless pit, and a great chain in his hand. And he laid hold on the dragon, that old serpent, which is the devil and Satan, and bound him a *thousand years*, and cast him into the bottomless pit, and shut him up, and set a seal upon him, that he should deceive the nations no more till *the thousand years* should be fulfilled; and after that he must be loosed a little season. And I saw thrones, and they sat upon them, and judgment was given unto them: and I saw the souls of them that were beheaded for the witness of Jesus, and for the word of God, and which had not worshipped the beast, neither his image, neither had received his mark upon their foreheads, or in their hands; and they lived and reigned with Christ a *thousand years*. But the rest of the dead lived not again till *the thousand years were finished*. This is the first resurrection *." This passage all the ancient millenarians took in a sense grossly literal; and taught, that during the millenium the saints on earth were to enjoy every bodily delight. The moderns, on the other hand, consider the power and pleasure of this kingdom as wholly spiritual; and they represent them as not to commence till after the conflagration of the present earth. But that this last supposition is a mistake, the very next verse except one assures us: for we are there told, that "when the thousand years are expired, Satan shall be loosed out of his prison, and shall go out to deceive the nations which are in the four quarters of *the earth*;" and we have no reason to believe that he will have such power or such liberty in "the new heavens and the *new earth* wherein dwelleth righteousness."

* Rom. xx.
1-6.

§ Rom. vi.
13.

† Eph. v.
24.

† 1. Chron.
23.

For this and other reasons, which our limits will not permit us to enumerate, the most judicious critics contend, that the prophecies of the millenium point, not to a resurrection of martyrs and other just men to reign with Christ a thousand years in a visible kingdom upon earth, but to that state of the Christian church, which, for a thousand years before the general judgment, will be so pure and so widely extended, that, when compared with the state of the world in the ages preceding, it may, in the language of scripture, be called a resurrection from the dead. In support of this interpretation they quote two passages from St Paul, in which a conversion from Paganism to Christianity, and a reformation of life, is called a resurrection from the dead:—"Neither yield ye your members as instruments of unrighteousness unto sin; but yield yourselves unto God as those that are *alive from the dead* §." And again, "Wherefore he saith, Awake thou that sleepest, and *arise from the dead*, and Christ shall give thee light †." It is likewise to be observed, that in all the descriptions of the resurrection and future judgment which are given us at such length in the gospels and epistles, there is no mention made of a *first* and *second* resurrection at the distance of a thousand years from each other. There is indeed an order in the resurrection: for we are told †, that "every man shall rise in his own order; Christ the first fruits, afterwards they that are Christ's at his coming, &c." But were the millenarian hypothesis well founded, the words should rather have run thus: "Christ the first fruits, then the martyrs at his coming, and a thousand years afterwards the residue of mankind. Then cometh the end, &c."

Millenium. These arguments strongly incline us to believe, that by the reign of Christ and the saints for a thousand years upon earth, nothing more is meant, than that before the general judgment the Jews shall be converted, genuine Christianity be diffused through all nations, and mankind enjoy that peace and happiness which the faith and precepts of the gospel are calculated to confer on all by whom they are sincerely embraced.

Our Saviour's own account of his religion is, that from a small beginning it will increase to the full harvest. The millenium therefore is to be considered as the full effect of the Christian principles in the hearts of men, and over the whole world; and the divines who have treated of this subject endeavour to prove, that this is to be expected from the facts which have already existed, and from the importance of the Christian doctrine.

1. The gradual progress of Christianity is no objection to this fact. This is similar to the progress and advancement from less to greater perfection in every thing which possesses vegetable or animal life. The same thing is observed in the arts, in civilization, in societies, and in individuals—and why should it not be admitted to have place in religion? There is indeed a general principle on which a gradual progression, both in the natural and moral world, is founded. The Almighty never employs supernatural means where the thing can be accomplished by those which are natural. This idea is of the most general extent through the whole of the present system of nature. The possibility of another plan could easily be admitted; but in this case there would be a total alteration of every part of the works of God or of man that we are acquainted with. In the same manner, if the religion of Christ had been irresistible, it would have totally altered its natural consequences. It was necessary, therefore, from the present condition of man, as an active, intelligent, and accountable being, that means should be employed; and wherever means are employed, the effects produced must be gradual, and not instantaneous.

2. Though the progress of a divine revelation be gradual, yet it is to be expected, from the wisdom and compassion of God, that it will still be advancing in the hearts of men, and over the world. In the first age of the church, the word of God, supported by miracles, and by the animated zeal of men, who spake what they saw and heard, grew and prevailed. In this case supernatural means were necessary, because the prejudices of the world could not be subdued without them. It was the first watering of a plant which you afterwards leave to the dew of heaven. Miracles at the same time were employed only as the means of conviction; and they were not continued, because in this case they would have become a constant and irresistible principle, incompatible with the condition of man as a reasonable agent. After this power was withdrawn, there were many ages of ignorance and superstition in the Christian church. But what is necessary to be established on this subject is, not that the progress of Christianity has never been interrupted, but that on the whole it has been advancing. The effects of this religion on mankind, in proportion as it was received, were immediate and visible:

Millenium, fible: It destroyed the gross superstition of idol-worship: it abolished the practice, which was general in the heathen world, of reducing to the lowest state of servitude the greatest part of our brethren: it softened the horrors of war even when the vices of mankind made defence necessary: it entered into social and private life; and taught men benevolence, humanity, and mercy. It is in these blessed effects that we can observe the progress of Christianity even to this day. Superstition and idolatry were soon engrafted on the stem which our Saviour planted in the world; but the simplicity of the gospel has been gradually undermining the fabric of superstition; and the men who are most nearly interested in the deceit are now almost ashamed to show their faces in the cause. The practice of slavery has, generally speaking, been extinguished in the Christian world; yet the remains of it have been a disgrace to the Christian name, and the professors of that religion have now begun to see the inconsistency. War is not only carried on with less animosity, and less havoc of the human species; but men begin to cultivate more generally, and to delight in, the arts of peace. The increasing spirit of charity and benevolence, of which it were easy to give unexampled instances in the present age, is a decided proof of the increasing influence of Christianity. At the same time, if, instead of these general principles, we were to descend to private examples of infidelity or of wickedness, it would be easy to bring proofs in support of an opposite opinion: but the reasoning would by no means be equally conclusive; for if the general principles by which society is regulated be more liberal and merciful, it is evident that there is more goodness in a greater number of the human race. Society is nothing more than a collection of individuals; and the general tone, especially when it is on the side of virtue, which almost in every instance opposes the designs of leading and interested men, is a certain evidence of the private spirit. To show that this reformation is connected with Christianity, it is unnecessary to state any comparison between the influence of heathen and the influence of Christian principles; between civilization as depending on the powers of the human understanding, and on the efficacy of the word of God. The whole of this controversy may be appealed to an obvious fact, viz. that as any nation has come nearer to the simplicity of the gospel in the standard of its worship, it has been more possessed of those national virtues which we have ascribed to the influence of Christianity. This fact is worth a thousand volumes of speculation on this subject.

3. A revelation sanctioned by God, for a benevolent purpose, will be expected to produce effects corresponding to the wisdom which gave it, and to the purpose for which it is employed. It may be gradual; but it will be increasing, and it must increase, to the full harvest. He that has begun the good work will also finish it. It is reasonable to expect this illustrious success of the gospel, both from the nature of the thing, and from the prophecies contained in the sacred scriptures. The precepts of the gospel, in their genuine sense, are admirably calculated for the peace and welfare both of individuals and society. The greatest liberality of mind, the greatest generosity of temper, the most unbounded love, and the greatest indifference

to the accumulation of this world's property, if they glowed from breast to breast, and operated with equal force on all men, would be productive of equal good and happiness to all. We are scarcely able to perceive the force of this at first view, because the deceit and imposition which yet exist in the world, prevent the operation of the best principles even in the best hearts. But in proportion to the improvement of mankind, what is their real interest, and what are the real objects of happiness, will gradually unfold. The contempt of vice will be greater in proportion to the scarcity of it: for one villain gives countenance and support to another, just as iron sharpeneth iron. This opens to our view another fact connected with the practice of Christianity, namely, that the nearer it arrives to its perfect state, it will be the more rapid in its progress. The beauty of holiness will be more visible; and, in the strong language of the prophet, "the earth shall bring forth in one day, and a nation shall be born at once *." This future perfection of the gospel is consistent with its nature and importance.—8.

We can scarcely believe that means so admirably adapted to the reformation of mankind should be without their effect; and if the most difficult part be already accomplished, we have no reason to apprehend that the scheme will not be completed. This fact is also clearly the subject of ancient prophecy. For "thus saith the Lord †, I will extend peace to her like a river, † Ver. 12, and the glory of the Gentiles like a flowing stream. 23. And it shall come to pass, from one sabbath to another, and from one new moon to another, shall all flesh come to worship before me, saith the Lord."—"Violence shall be no more heard in thy land, wasting nor destruction within thy border; but thou shalt call thy walls salvation, and thy gates praise." (Is. lx. 18.)

Without entering more minutely on the prophecy already quoted from chap. xx. of the book of the Revelation, it is sufficient to observe, that Dr Whitby, in his treatise on the millenium at the end of his commentary, proves, in the clearest manner, from the spirit of the passage and the similarity of the expressions with those of other prophets, that it refers to a state of the church for a thousand years, which shall be like life from the dead. The commencement of this period is connected with two events; the fall of antichrist, and the conversion of the Jews. The latter of these events must be considered as a key to all the prophecies concerning the millenium. As the Jews were the ancient people of God, and as their conversion is to be the previous step to the general knowledge of Christianity, the prophecies of the millenium have a chief relation to this important event. We have already observed, that God never interposes with miraculous power to produce what can be effected by natural means; and from what we know of human nature, we cannot but perceive that the conversion of the Jews will powerfully operate to the general conversion of mankind. Freed from those prejudices which now make them the objects of hatred in all nations, and fired with that zeal by which new converts are always actuated, they will preach the gospel with a fervour of which we, who have long been blessed with its rays, can hardly form a conception; and, by their present dispersion over the whole earth, they will be enabled to adapt their instructions to every individual of the

Millepes human race in the language of his fathers. Indeed, if they are not at some future period to be employed by Providence for this purpose, it is difficult, if not impossible, to give any reason for their dispersed state and political existence. Just now it must be confessed that they are the most implacable enemies of the Christian name; but their conversion is not on that account more unlikely or improbable than were events which have taken place of nearly equal importance a very few years ago. On the whole, the perfection of Christianity is a doctrine of reasonable expectation to the church; and it is impossible for the advocates for natural religion to deny that unlimited obedience to its precepts is consistent with the purest state of liberty and of happiness. This is the only millenium which the prophets and apostles, as we understand them, promise to the saints; but as men figuring in the very first ranks of learning have thought otherwise, we would not be too confident that our interpretation is just.—Such of our readers as wish for further information, will find it in the works of Mr Mede, bishop Newton, Dr Whitby, and Dr Gill; and to those masterly writers we refer them for that satisfaction which in such an article as this cannot be given.

MILLEPES, or WOOD-LOUSE, in zoology; a species of ONISCUS. These insects are found in cellars, under stones, and in cold moist places; in the warmer countries they are rarely met with. Millepedes have a faint disagreeable smell, and a somewhat pungent, sweetish, nauseous taste. They have been highly celebrated in suppressions of urine, in all kinds of obstructions of the bowels, in the jaundice, weakness of sight, and a variety of other disorders. Whether they have any just title to these virtues is greatly to be doubted; thus much is certain, that their real effects come far short of the character usually give them.

MILLEPORA, in natural history, a name by which Linnæus distinguishes that genus of lithophytes, of a hard structure and full of holes, which are not stellate or radiated, and whose animal is the hydra, in which it differs from the madrepora, and comprehending 14 different species.

In the millepora, the animal which forms and inhabits it occupies the substance; and it is observed that the milleporæ grow upon one another; their little animals produce their spawn; which attaching itself either to the extremity of the body already formed, or underneath it, gives a different form to this production. Hence the various shapes of the millepora, which is composed of an infinite number of the cells of those little insects, which all together exhibit different figures, though every particular cellula has its essential form, and the same dimensions, according to its own species.

MILLET, in botany. See MILIUM.

MILLIARE, or MILLIARIUM, a Roman mile, which consisted of 100 paces, *mille passus*, whence the name.

MILLIARIUM AUREUM, was a gilded pillar in the forum of Rome, at which all the highways of Italy met, as one common centre. From this pillar the miles were counted, and at the end of every mile a stone was put down. The milliary column was erected by Augustus Cæsar, and, as we are informed by travellers, is still to be seen.

MILLING of CLOTH. See FULLING.

MILLION, in arithmetic, the sum of ten hundred thousand, or a thousand times a thousand. See ARITHMETIC.

MILLO, a part of mount Zion at its extremity; and therefore called *Millo* of the city of David (2 Chron. xxxii.), taken in with the wall that encompassed mount Zion. Uncertain whether *Beth-Millo*, (Judges ix. 20.) denotes a place; if it did, it lay near Sechem.

MILLOT (Claude Francis Xavier), of the French academy, was born at Besançon March 1726, and was for some time a Jesuit. He was consecrated for the pulpit, and continued to preach after he left the society: But the weakness of his voice, his timidity, and the awkwardness of his manner, not permitting him to continue in this profession, he relinquished it, although he had preached Advent sermons at Versailles, and Lent sermons at Luneville. The Marquis de Felino, minister of Parma, instituted an historical class for the benefit of the young nobility; and, at the desire of M. le Duc de Nivernois, he gave the charge of it to the Abbé Millot. The minister having occasioned a kind of rebellion among the people by some innovations which he had made in the state, the Abbé continued attached to the interests of his patron, and would not desert him till the storm was blown over. When he was told that he would lose his place by this conduct, he replied, "My place is with a virtuous persecuted man who has been my benefactor; and that I shall never lose." At length, having filled the historical chair with great approbation, he returned to France, and was appointed preceptor to M. le Duc d'Enghien. In this situation he died, A. D. 1785, aged 59. The Abbé Millot did not shine in company; he was cold and reserved in his manner; but every thing he said was judicious, and exactly in point.—D'Alembert said, that of all his acquaintance the Abbé Millot had the fewest prejudices and the least pretension. He composed several works, which are digested with great care, and written in a pure, simple, and natural style. The principal are, 1. *Elemens de l'Histoire de France, depuis Clovis jusque a Louis XIV.* 3 vols in 12mo. The author, selecting the most curious and important facts, has suppressed every thing foreign to the subject; and has not only arranged the materials in their proper order, but chosen them with the greatest judgment. Querlon thought this the best abridgment which we have of the history of France, and preferred it to that of the President Henault. 2. *Elemens de l'Histoire d'Angleterre, depuis son origine sous les Romains, jusqu' a George II.* 3 vols 12mo. In this valuable abridgment, the author satisfies, without tiring, his readers. It is all that is necessary for those who wish to gain a general knowledge of the English history, without entering minutely into its particular parts.—3. *Elemens de l'Histoire Universelle*, 9 vols. 12mo. A certain critic maintains, that this work is merely a counterfeit of Voltaire's general history. But this censure is altogether unjust. The ancient history in this work is wholly composed by the Abbé Millot; and, no less than the modern part, discovers his abilities in the choice of facts, in divesting them of useless circumstances, in relating them without prejudice, and in adorning them with judicious reflections. 4. *L'Histoire*

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stoire des Troubadours, 3 vols. 12mo, compiled from the manuscripts of M. de Sainte-Palaie. This work appears rather tedious, because it treats of men almost unknown, and most of them deserving to be so. What is there quoted from the Provencal poets is not at all interesting; and, according to the observation of a man of wit, "it serves no purpose to search curiously into a heap of old ruins while we have modern palaces to engage our attention." 5. *Memoires politiques et Militaires, pour servir à l'Histoire de Louis XIV. et de Louis XV.* composed from original papers collected by Adrian Maurice duc de Noailles, marshal of France, in 6 vols 12mo. 6. The Abbé Millot published also several Discourses, in which he discusses a variety of philosophical questions, with more ingenuity of argument than fire of expression; and a translation of the most select harangues in the Latin historians; of which it has been remarked, as well as of the orations of the Abbé d'Olivet, that they are coldly correct, and elegantly insipid. The character of the author, more prudent and circumspect than lively and animated, seldom elevated his imagination above a noble simplicity without warmth, and a pure style without ostentation. Some of the critics, however, have accused him of declamation in some parts of his histories, particularly in those parts which concern the clergy. But, in our opinion, the word declamation is totally inapplicable to the writings of the Abbé Millot. He flatters, it is true, neither priests nor statesmen; and he relates more instances of vicious than of virtuous actions, because the one are infinitely more common than the other: But he relates them coldly; and he appears to be guided more by sincerity and a love of truth, than by that partial philosophy which blames the Christian religion for those evils which it condemns.

MILLO, a celebrated athlete of Crotona in Italy. His father's name was Diotimus. He early accustomed himself to carry the greatest burdens, and by degrees became a prodigy of strength. It is said that he carried on his shoulders a young bullock, four years old, for above forty yards; and afterwards killed it with one blow of his fist, and eat it up in one day. He was seven times crowned at the Pythian games, and six at the Olympian. He presented himself a seventh time; but no one had the courage or boldness to enter the lists against him. He was one of the disciples of Pythagoras; and to his uncommon strength, it is said, the learned preceptor and his pupils owed their life: The pillar which supported the roof of the school suddenly gave way; but Milo supported the whole weight of the building, and gave the philosopher and his auditors time to escape. In his old age, Milo attempted to pull up a tree by the roots, and break it. He partly effected it; but his strength being gradually exhausted, the tree when half cleft re-united, and his hands remained pinched in the body of the tree. He was then alone; and, being unable to disentangle himself, he was devoured by the wild beasts of the place, about 500 years before the Christian æra.

MILLO (T. Annius), a native of Lanuvium, who attempted to obtain the consulship at Rome by intrigue and seditious tumults. Clodius the tribune opposed his views; yet Milo would have succeeded but for the following event: As he was going into the country,

attended by his wife and a numerous retinue of gladiators and servants, he met on the Appian road his enemy Clodius, who was returning to Rome with three of his friends and some domestics completely armed.—A quarrel arose between the servants. Milo supported his attendants, and the dispute became general.—Clodius received many severe wounds, and was obliged to retire to a neighbouring cottage. Milo pursued his enemy in his retreat, and ordered his servants to dispatch him. The body of the murdered tribune was carried to Rome, and exposed to public view. The enemies of Milo inveighed bitterly against the violence and barbarity with which the sacred person of a tribune had been treated. Cicero undertook the defence of Milo; but the continual clamours of the friends of Clodius, and the sight of an armed soldiery, which surrounded the seat of judgment, so terrified the orator, that he forgot the greatest part of his arguments, and the defence he made was weak and injudicious.—Milo was condemned, and banished to Massilia. Cicero soon after sent his exiled friend a copy of the oration which he had prepared for his defence, in the form in which we have it now; and Milo, after he had read it, exclaimed, *O Cicero, hadst thou spoken before my accusers in these terms, Milo would not be now eating figs at Marseilles.* The friendship and cordiality of Cicero and Milo were the fruits of long intimacy and familiar intercourse. It was to the successful labours of Milo that the orator was recalled from banishment, and restored to his friends.

MILLO, (anciently *Melos*), an island in the Archipelago, about 50 miles in circumference, with a harbour, which is one of the largest in the Mediterranean. The principal town is of the same name as the island, and was prettily built, but abominably nasty: the houses are two stories high, with flat roofs; and are built with a sort of pumice-stone, which is hard, blackish, and yet very light.

This island was formerly rich and populous. From the earliest times of antiquity it enjoyed pure liberty. The Athenians, not being able to persuade the Melians to declare in their favour in the Peloponnesian war, made a descent upon the island, and attacked them vigorously. In two different expeditions they failed of their purpose: but returning with more numerous forces, they laid siege to Melos; and, obliging the besieged to surrender at discretion, put to the sword all the men who were able to bear arms. They spared only the women and children, and these they carried into captivity. This act of cruelty puts humanity to the blush, and disgraces the Athenian name. But war was then carried on with a degree of wild rage, unexampled in the present times. Republics know not how to pardon, and always carry their vengeance to an extravagant height. When Lyfander, the Lacedæmonian general, came to give law to the Athenians, he expelled the colony which they had sent to Melos, and re-established the unfortunate remains of its original inhabitants.

This island lost its liberty when Rome, aspiring to the empire of the world, conquered all the isles of the Archipelago. In the partition of the empire, it fell to the share of the eastern emperors, was governed by particular dukes, and was at last conquered by Soliman II. Since that period, it has groaned under the

Milo.

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Milo yoke of Turkish despotism, and has lost its opulence and splendor. At the commencement of the present century, it boasted of 17 churches, and 11 chapels, and contained more than 20,000 inhabitants. It was very fertile in corn, wine, and fruits; and the whole space from the town to the harbour, which is nearly two miles, was laid out in beautiful gardens. M. Tournefort, who visited it in the year 1700, gives a fine description of it. "The earth, being constantly warmed by subterraneous fires, produced almost without interruption plenteous crops of corn, barley, cotton, exquisite wines, and delicious melons. St Elias, the finest monastery in the island, and situated on the most elevated spot, is encircled with orange, citron, cedar, and fig trees. Its gardens are watered by a copious spring. Olive trees, of which there are but few in the other parts of the island, grow in great numbers around this monastery. The adjacent vineyards afford excellent wine. In a word, all the productions of the island are the very best of their kinds; its partridges, quails, kids, and lambs, are highly valued, and yet may be bought at a very cheap price."

Letters on Greece, Let. 44. Were M. Tournefort to return to Milo, M. Savary* assures us, he would no longer see the fine island which he has described. "He might still see alum, in the form of feathers, and fringed with silver thread, hanging from the arches of the caverns; pieces of pure sulphur filling the cliffs of the rocks; a variety of mineral springs; hot baths, (though these are now only a set of small dirty caves); the same subterraneous fires which in his days warmed the bosom of the earth, and were the cause of its extraordinary fertility: but instead of 5000 Greeks, all paying the capitation tax (A), he would now find no more than about 700 inhabitants on an island 18 leagues in circumference. He would sigh to behold the finest lands lying uncultivated, and the most fertile valleys converted into morasses; of the gardens scarcely a vestige left; three-fourths of the town in ruins, and the inhabitants daily decreasing. In short, during the last 50 years, Milo has assumed a quite different appearance. The plague, which the Turks propagate every where, has cut off one part of its inhabitants; the injudicious administration of the Porte, and the oppressive extortions of the Captain Pacha, have destroyed the rest. At present, for want of hands, they cannot cut out a free channel for their waters, which stagnate in the valleys, corrupt, and infect the air with their putrid exhalations. The salt marshes, of which there are numbers in the island, being equally neglected, produce the same effects. Add to these inconveniences, those sulphureous exhalations which arise all over the island, and by which the inhabitants of Milo are afflicted with dangerous fevers during three-fourths of the year. Perhaps they may be obliged to forsake their country. Every countenance is yellow, pale, and livid; and none bears any marks of good health. The prudent traveller will be careful to spend but a very short time in this unwholesome country, unless he chooses to expose himself to the danger of catching a fever.

To sleep over-night, or to spend but one day in the island, is often enough to occasion his being attacked with that distemper.

"Yet (continues our author) a judicious and enlightened government might expel those evils which ravage Milo. Its first care would be to establish a lazaret, and to prohibit vessels whose crews or cargoes are infected with the plague from landing. Canals might next be cut, to drain the marshes, whose exhalations are so pernicious. The island would then be re-peopled. The sulphureous vapours are not the most noxious. These prevailed equally in ancient times, yet the island was then very populous. M. Tournefort, who travelled through it a time less distant from the period when it was conquered by the Turks, and when they had not yet had time to lay it waste, reckons the number of its inhabitants (as we have said) at about 20 000. The depopulation of Milo is therefore to be ascribed to the despotism of the Porte, and its detestable police."

The women of Milo, once so celebrated for their beauty, are now fallow, unhealthy, and disgustingly ugly; and render themselves still more hideous by their dress, which is a kind of loose jacket, with a white coat and petticoat, that scarcely covers two-thirds of their thighs, barely meeting the stocking above the knee. Their hind hair hangs down the back in a number of plaits; that on the fore-part of the head is combed down each side of the face, and terminated by a small stiff curl, which is even with the lower part of the cheek. All the inhabitants are Greeks, for the Turks are not fond of trusting themselves in the small islands; but every summer the captain bashaw goes round with a squadron to keep them in subjection, and to collect the revenue. When the Russians made themselves masters of the Archipelago during the late war, many of the islands declared in their favour; but being abandoned by the peace, they were so severely mulcted by the Grand Signior, that they have professed a determination to remain perfectly quiet in future. As the Turks, however, do not think them worth a garrison, and will not trust them with arms and ammunition, all those which the Russians may choose to invade will be obliged to submit. The two points which form the entrance of the harbour, crossing each other, render it imperceptible until you are close to it. Thus, while you are perfectly secure within it, you find great difficulty in getting out, particularly in a northerly wind; and as no trade is carried on except a little in corn and salt, Milo would scarcely ever be visited, were it not that, being the first island which one makes in the Archipelago, the pilots have chosen it for their residence. They live in a little town on the top of a high rock, which, from its situation and appearance, is called the *Castle*.—Partridges still abound in this island; and are so cheap, that you may buy one for a charge of powder only. The peasants get them by standing behind a portable screen, with a small aperture in the centre, in which they place the muzzle of their piece, and then draw the

(A) Grown up men are the only persons who pay the capitation tax. Therefore, by adding to the number of 5000 who paid the tax, the women, boys, and girls, we find that Milo, in the days of Tournefort, contained at least 20,000 souls.

Miltone the partridges by a call. When a sufficient number are collected, they fire among them, and generally kill from four to seven at a shot: but even this method of getting them is so expensive, from the scarcity of ammunition, that the people can never afford to shoot them, except when there are gentlemen in the island, from whom they can beg a little powder and shot.

Milo is 60 miles north of Candia; and the town is situated in E. Long. 25. 15. N. Lat. 36. 27.

MILSTONE. See **MILL-STONE.**

MILT, in anatomy, a popular name for the **SPLEEN**.

MILT, or *Melt*, in natural history, the soft roe in fishes; thus called from its yielding, by expression, a whitish juice resembling milk. See **ROE**.

The milt is properly the seed or spermatie part of the male fish. The milt of a carp is reckoned a choice bit. It consists of two long whitish irregular bodies, each included in a very thin fine membrane. M. Petit considers them as the testicles of the fish wherein the seed is preserved; the lower part, next the anus, he takes for the *vesiculae seminales*.

MILTHORP, a port-town of Westmoreland, at the mouth of the Can, five miles from Kendal. It is the only sea-port in the county; and goods are brought hither in small vessels from Grange in Lancashire. Here are two paper-mills. It has a market on Friday, and a fair on Old May-day; and there is a good stone-bridge over the river Betha, which runs through the town.

MILTIADES, an Athenian captain, son of Cypselus. He obtained a victory in a chariot race at the Olympic games. He led a colony of Athenians to the Chersonesus. The causes of this appointment are striking and singular. The Thracian Dolonci, harassed by a long war with the Absynthians, were directed by the oracle of Delphi to take for their king the first man they met in their return home, who invited them to come under his roof and partake his entertainments. This was Miltiades, whom the appearance of the Dolonci, with their strange arms and garments, had struck. He invited them to his house, and was made acquainted with the commands of the oracle. He obeyed; and when the oracle of Delphi had approved a second time the choice of the Dolonci, he departed for the Chersonesus, and was invested by the inhabitants with sovereign power. The first measures he took was to stop the further incursions of the Absynthians, by building a strong wall across the Isthmus. When he had established himself at home, and fortified his dominions against foreign invasion, he turned his arms against Lampfacus. His expedition was unsuccessful; he was taken in an ambuscade, and made prisoner. His friend Cræsus king of Lydia was informed of his captivity, and procured his release. He lived few years after he had recovered his liberty. As he had no issue, he left his kingdom and possessions to Stefagoras the son of Cimon, who was his brother by the same mother. The memory of Miltiades was greatly honoured by the Dolonci, and they regularly celebrated festivals and exhibited shows in commemoration of a man to whom they owed their greatness and preservation.

MILTIADES, the son of Cimon, and brother of

Stefagoras mentioned in the preceding article, was some time after the death of the latter, who died without issue, sent by the Athenians with one ship to take possession of the Chersonesus. At his arrival Miltiades appeared mournful, as if lamenting the recent death of his brother. The principal inhabitants of the country visited the new governor to condole with him; but their confidence in his sincerity proved fatal to them. Miltiades seized their persons, and made himself absolute in Chersonesus. To strengthen himself, he married Hegesipyla, the daughter of Olorus the king of the Thracians. His triumph was short. In the third year of his government, his dominions were threatened by an invasion of the Scythian Nomades, whom Darius had some time before irritated by entering their country. He fled before them; but as their hostilities were of short duration, he was soon restored to his kingdom. Three years after, he left Chersonesus; and set sail for Athens, where he was received with great applause. He was present at the celebrated battle of **MARATHON**; in which all the chief officers ceded their power to him, and left the event of the battle to depend upon his superior abilities. He obtained an important victory over the more numerous forces of his adversaries. Some time after, Miltiades was intrusted with a fleet of 70 ships, and ordered to punish those islands which had revolted to the Persians. He was successful at first; but a sudden report that the Persian fleet was coming to attack him, changed his operations as he was besieging Paros. He raised the siege, and returned to Athens. He was accused of treason, and particularly of holding correspondence with the enemy. The falsity of these accusations might have appeared, if Miltiades had been able to come into the assembly. But a wound which he had received before Paros detained him at home; and his enemies, taking advantage of his absence, became more eager in their accusations, and louder in their clamours. He was condemned to death; but the rigour of his sentence was retracted on the recollection of his great services to the Athenians, and he was put into prison till he had paid a fine of 50 talents to the state. His inability to discharge so great a sum detained him in confinement; and his wounds becoming incurable, he died a prisoner about 489 years before the Christian era. His body was ransomed by his son Cimon; who was obliged to borrow and pay the 50 talents, to give his father a decent burial.—The accusations against Miltiades were probably the more readily believed by his countrymen, when they remembered how he made himself absolute in Chersonesus; and in condemning the barbarity of the Athenians towards a general, who was the source of their military prosperity, we must remember the jealousy which ever reigns among a free and independent people, and how watchful they are in defence of the natural rights which they see wrested from others by violence. Cornelius Nepos has written the life of Miltiades the son of Cimon; but his history is incongruous and unintelligible, from his confounding the actions of the son of Cimon with those of the son of Cypselus. Greater reliance is to be placed on the narration of Herodotus, whose veracity is confirmed, and who was indisputably better informed and more capable of giving an account of the

Miltiades.

Milton. the life and exploits of men who flourished in his age. and of which he could see the living monuments. Herodotus was born about six years after the famous battle of Marathon; and C. Nepos, as a writer of the Augustan age, flourished about 450 years after the age of the father of history.

MILTON (John), the most illustrious of the English poets, was descended of a genteel family, seated at a place of their own name, viz. *Milton*, in Oxfordshire. He was born December 9. 1608, and received his first rudiments of education under the care of his parents, assisted by a private tutor. He afterwards passed some time at St Paul's school, London; in which city his father had settled, being engaged in the business of a scrivener. At the age of 17, he was sent to Christ's college, Cambridge; where he made a great progress in all parts of academical learning; but his chief delight was in poetry. In 1628, he proceeded bachelor of arts, having performed his exercise for it with great applause. His father designed him for the church; but the young gentleman's attachment to the muses was so strong, that it became impossible to engage him in any other pursuits. In 1632, he took the degree of master of arts; and having now spent as much time in the university as became a person who determined not to engage in any of the three professions, he left the college, greatly regretted by his acquaintance, but highly displeased with the usual method of training up youth there for the study of divinity; and being much out of humour with the public administration of ecclesiastical affairs, he grew dissatisfied with the established form of church government, and disliked the whole plan of education practised in the university. His parents, who now dwelt at Horton, near Colnbrook, in Buckinghamshire, received him with unabated affection, notwithstanding he had thwarted their views of providing for him in the church, and they amply indulged him in his love of retirement; wherein he enriched his mind with the choicest stores of Grecian and Roman literature: and his poems of *Comus*, *Illegro*, *Il Penferoso*, and *Lycidas*, all wrote at this time, would have been sufficient, had he never produced any thing more considerable, to have transmitted his fame to latest posterity. However, he was not so absorbed in his studies as not to make frequent excursions to London; neither did so much excellence pass unnoticed among his neighbours in the country, with the most distinguished of whom he sometimes chose to relax his mind, and improve his acquaintance with the world as well as with books.—After five years spent in this manner, he obtained his father's permission to travel for farther improvement.—At Paris he became acquainted with the celebrated Hugo Grotius; and from thence travelling into Italy, he was every where caressed by persons of the most eminent quality and learning.

Upon his return home, he set up a genteel academy in Aldersgate-street.—In 1641, he began to draw his pen in defence of the Presbyterian party; and the next year he married the daughter of Richard Powell, Esq; of Forest-Hill in Oxfordshire. This lady, however, whether from a difference on account of party, her father being a zealous royalist, or some other cause, soon thought proper to return to her relations; which so incensed her husband, that he resolved never to take

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Milton. her again, and wrote and published several tracts in defence of the doctrine and discipline of divorce. He even made his addresses to another lady; but this incident proved the means of a reconciliation with Mrs Milton.

In 1644, he wrote his Tract upon Education; and the restraint on the liberty of the press being continued by act of parliament, he wrote boldly and nobly against that restraint. In 1645, he published his juvenile poems; and about two years after, on the death of his father, he took a smaller house in High Holburn, the back of which opened into Lincoln's-Inn Fields.—Here he quietly prosecuted his studies, till the fatal catastrophe and death of Charles I.; on which occasion he published his *Tenure of Kings and Magistrates*, in justification of the fact. He was now taken into the service of the commonwealth, and made Latin secretary to the council of state, who resolved neither to write to others abroad, nor to receive any answers, except in the Latin tongue, which was common to them all. The famous *Εἰκὼν βασιλική* coming out about the same time, our author, by command, wrote and published his *Iconoclastes* the same year. It was also by order of his masters, backed by the reward of 1000*l.* that, in 1651, he published his celebrated piece, entitled *Pro Populo Anglicano Defensio*. “A Defence of the People of England, in answer to Salmasius's Defence of the King;” which performance spread his fame over all Europe.—He now dwelt in a pleasant house, with a garden, in Petty France, Westminster, opening into St James's Park. In 1652, he buried his wife, who died not long after the delivery of her fourth child; and about the same time he also lost his eye-sight, by a *gutta serena*, which had been growing upon him many years.

Cromwell took the reins of government into his own hands in the year 1653; but Milton still held his office. His leisure-hours he employed in prosecuting his studies; wherein he was so far from being discouraged by the loss of his sight, that he even conceived hopes this misfortune would add new vigour to his genius; which, in fact, seems to have been the case.—Thus animated, he again ventured upon matrimony: his second lady was the daughter of Captain Woodstock of Hackney: she died in childbed about a year after. On the deposition of the protector, Richard Cromwell, and on the return of the long parliament, Milton being still continued secretary, he appeared again in print; pleading for a farther reformation of the laws relating to religion; and, during the anarchy that ensued, he drew up several schemes for re-establishing the commonwealth, exerting all his faculties to prevent the return of Charles II. England's destiny, however, and Charles's good fortune, prevailing, our author chose to consult his safety, and retired to a friend's house in Bartholomew-Close. A particular prosecution was intended against him; but the just esteem to which his admirable genius and extraordinary accomplishments entitled him, had raised him so many friends, even among those of the opposite party, that he was included in the general amnesty.

This storm over, he married a third wife, Elizabeth, daughter of Mr Minshall a Cheshire gentleman; and

8

not

Milton, not long after he took a house in the Artillery Walk, leading to Bunhill-Fields. This was his last stage: here he sat down for a longer continuance than he had been able to do any where; and though he had lost his fortune (for every thing belonging to him went to wreck at the Restoration), he did not lose his taste for literature, but continued his studies with almost as much ardour as ever; and applied himself particularly to the finishing his grand work, the *Paradise Lost*; one of the noblest poems that ever was produced by human genius.—It was published in 1667, and his *Paradise Regained* came out in 1670.—This latter work fell short of the excellence of the former production; although, were it not for the transcendent merit of *Paradise Lost*, the second composition would doubtless have stood foremost in the rank of English epic poems. After this he published many pieces in prose; for which we refer our readers to the edition of his Historical, Poetical, and Miscellaneous Works, printed by Millar, in 2 vols 4to, in 1753.

In 1674, this great man paid the last debt to nature at his house in Bunhill-fields, in the 66th year of his age; and was interred on the 12th of November, in the chancel of St Giles's, Cripplegate.—A decent monument was erected to his memory, in 1737, in Westminster abbey, by Mr Benson, one of the auditors of the imprest.—As to his person, it was remarkably handsome; but his constitution was tender, and by no means equal to his incessant application to his studies.—Though greatly reduced in his circumstances, yet he died worth 1500 l. in money, beside his household goods.—He had no son; but left behind him three daughters, whom he had by his first wife.

MILTON, the name of several places in England; particularly,

MILTON, or *Middleton*, in Dorsetshire, south-west of Blandford, near the road to Dorchester, 114 miles from London. It is chiefly noted for its abbey, built by King Athelstan. The church stands near the south side of the abbey. It is a large and magnificent pile of Gothic architecture, and contains several ancient monuments. Here is an alms-house for six people, who have 12s. a-week, and three yards of cloth for a gown, one pair of shoes and stockings, and 10s. each on St Thomas's day yearly. Here is a free-school, and a market on Tuesdays.

MILTON, in Kent, near Sittinbourn and the Isle of Sheppey, 6 miles north-west of Feverham, and 40 from London. It is also called *Middleton* from its situation near the middle of the county, *i. e.* from Deptford to the Downs. The kings of Kent had a palace here, which was castellated, and stood below the church; but was burnt down in Edward the Confessor's time by Earl Godwin, &c. Its church stands near a mile off. On approaching the town up the Thames, by the East-Swale, it seems hid among the creeks: yet it is a large town; and has a considerable market on Saturdays, and a fair on July 24. The oysters taken hereabouts are the most famous of any in Kent. This town is governed by a portreeve, chosen yearly on St James's-day, who supervises the weights and measures all over the hundred of Milton.

MILTON, in Kent, a mile on the east side of Gravesend, was incorporated with it in the reign of Queen Elizabeth, by the name of the portreeve, jurats, and

inhabitants of the towns of Gravesend and Milton. King Henry VIII. raised a platform or block-house here, for the defence both of this town and Gravesend, and the command of the river. It has a fair Jan. 25.

MILVIUS MOLVIUS, or MULVIUS, *Pons*; a bridge on the Tiber, built by Æmilius Scaurus the censor, in the time of Sylla, at two miles distance from the city, on the Via Flaminia, and repaired by Augustus. From this bridge the ambassadors of the Allobroges were brought back to Rome, by Cicero's management, and made a discovery of Catiline's conspiracy (Sallust). Near it Maxentius was defeated by Constantine (Eutropius). Now called *Ponte Molle*.

MILVIUS, in ornithology, a species of FALCO.

MIMI, MIMES, in the ancient comedy, were buffoons or mimics, who entertained the people by taking off certain characters, using such gestures as suited the persons or subjects they represented. There were on the Roman stage female performers of this kind called *mimæ*. The word is derived from *μιμεομαι*, *I imitate*. Some of the *mimi* acted their parts to the sound of the tibia; these they called *mimauli*.

MIMI were also a kind of farces or ludicrous comedies, generally performed by one person. They had no acts, nor any *exordium*.—The *mimi* were introduced upon the Roman stage long after comedy and tragedy had arrived at their full perfection. The actor wore no mask, but smeared his face with soot, was dressed in lambskin, wore garlands of ivy, and carried a basket of flowers and herbs, in honour of Bacchus, and diverted the audience with apish tricks and ridiculous dances. This was the state of the *mimi* soon after their first introduction; but they underwent many alterations, which it would take up too much room to relate, and which are not of sufficient importance to justify a detailed account. See PANTOMIMES.

MIMESIS, in rhetoric, the imitating the voice and gestures of another person.

MIMNERMUS, an ancient poet and musician, flourished about the beginning of the 6th century B. C. He was of Smyrna, and cotemporary with Solon. Athenæus gives him the invention of pentameter verse. His elegies, of which only a few fragments are preserved, were so much admired in antiquity, that Horace preferred them to those of Callimachus. He composed a poem of this kind, as we learn from Pausanias, upon the battle fought between the people of Smyrna, and the Lydians, under Gyges. He likewise was author of a poem in elegiac verse, quoted by Strabo, which he entitled *Nanno*, and in which we may suppose he chiefly celebrated a young and beautiful girl of that name, who, according to Athenæus, was a player on the flute, with whom he was enamoured in his old age. With respect to love matters, according to Propertius, his verses were more valuable than all the writings of Homer.

Plus in amore valet Mimnermi versus Homero.

Lib. i. Eleg. 9. v. 11.

And Horace bears testimony to his abilities, in describing that seducing passion:

Si Mimnermus uti censet, sine amore jocisque

Nil est jucundum, vivas in amore jocisque.

Epist. VI. Lib. i. v. 65.

E

If,

Milvius
II
Mimner-
mus.

Mimosa.

If, as wise Mimnermus said,
Life unblest with love and joy
Ranks us with the senseless dead,
Let these gifts each hour employ.

Alluding to some much admired lines of this Greek poet, which have been preserved by Stobæus.

Τὴς δὲ βίης, τὴ δὲ τιμῆς ἀπὲρ χρεὺς Ἀποδίδης, &c.

What is life and all its pride,
If love and pleasure be denied?
Snatch, snatch me hence, ye fates, when'er
The am'rous bliss I cease to share.
Oh let us crop each fragrant flow'r
While youth and vigour give us pow'r:
For frozen age will soon destroy
The force to give or take a joy;
And then, a prey to pain and care,
Detested by the young and fair,
The sun's blest beams will hateful grow,
And only shine on scenes of wo.

MIMOSA, the SENSITIVE PLANT: A genus of the polygamia order, belonging to the monœcia class of plants; and in the natural method ranking under the 33d order, *Lomentaceæ*. The hermaphrodite calyx is quinque-dentate; the corolla quinquefid; there are five or more stamina, one pistil, and a legumen: The male calyx is quinque-dentate; the corolla quinquefid; with five, ten, or more stamina.

The name *mimosa* signifies "mimic;" and is given to this genus on account of the sensibility of the leaves, which, by their motion, mimic or imitate, as it were, the motion of animals. See *SENSITIVE Plant*.

To this genus Linnæus joins many of the *acacias*; and it comprises near 60 different species, all natives of warm climates. Of the sorts cultivated here in our stoves, &c. some are of the shrub and tree kind, and two or three are herbaceous perennials and annuals. The sensitive kinds are exceedingly curious plants in the very singular circumstance of their leaves receding rapidly from the touch, and running up close together; and in some sorts the footstalks and all are affected, so as instantly to fall downward as if fastened by hinges, which last are called *humble sensitives*. They have all winged leaves, each wing consisting of many small pinnæ.

In the *Systema Vegetabilium*, this genus, including the *mimosas* properly so called, and the *acacias*, is divided into several sections, distinguished by the figure, situation, and arrangement, of the leaves; as, simple, simply-pinnated, bigeminous and tergeminous, conjugate and pinnated, doubly pinnated. The following are the most remarkable

Species, with their properties. 1. The *Sensitiva*, or common sensitive humble plant, rises with an under-shrubby prickly stem, branching six or eight feet high, armed with crooked spines; conjugated, pinnated leaves, with bijugated patial lobes or wings, having the inner ones the least, each leaf on a long footstalk; and at the sides and ends of the branches many purple flowers in roundish heads; succeeded by broad, flat, jointed pods, in radiated clusters.—This is somewhat of the humble sensitive kind; the leaves, footstalks and all, receding from the touch, though not with such facility as in some of the following sorts.

2. The *Pudica*, or bashful humble plant, rises with

an under-shrubby, declinated, prickly stem, branching two or three feet around, armed with hairy spines; pinnated, digitated leaves, each leaf being of five or more long folioles, attached by their base to a long footstalk, and spread out above like the fingers of a hand; and at the sides and ends of the branches roundish heads of greenish white flowers, succeeded by small jointed prickly pods.—This is truly of the humble sensitive kind; for by the least touch the leaves instantly recede, contract, close, and together with the footstalk quickly decline downward, as if ashamed at the approach of the hand.

3. The *Pernambucana*, or Pernambuco slothful mimosa, has unshrubby, procumbent, unarmed stems, branching two or three feet around; bipinnated leaves, of three or four pair of short, winged foliola; and at the axillas drooping spikes of pentandrous flowers, the lower ones castrated.—This species recedes very slowly from the touch, only contracting its pinnæ a little when smartly touched; hence the name *slothful mimosa*.

4. The *Asperata*, or Panama sensitive plant. Of this curious species, which has been well described by Dr Browne (but not figured), there is a good figure in the *Reliquiæ Houstonianæ* published by Sir Joseph Banks. It grows in moist places, and by the sides of rivulets, in the parishes of St James and Hanover, Jamaica. It seldom rises above three feet in height; but its slender branches extend considerably on the neighbouring bushes. It is armed with crooked, sharp, spines; so thickly set on the trunk, branches, and leaves, that there is no touching it with safety. But the plant has a beautiful appearance; the flowers are yellow and globular, growing at the extremity of the branches. The pods are hairy, brown, and jointed; each containing a small, flat, and brown seed. The leaves are numerous, small, and winged: next to those of the *mimosa pudica*, they are the most irritable; contracting with the least touch, and remaining so for several minutes after. This species would form a good hedge or fence round a garden; and by being trimmed now and then by a cutlass or gardener's scissars, may be easily kept from spreading.

5. The *Punctata*, or punctated sensitive mimosa, rises with a shrubby, upright, taper, spotted, unarmed stem, branching erectly five or six feet high; bipinnated leaves, of four or five pair of long winged folioles, having each about 20 pair of pinnæ; and at the axillas and termination of the branches oblong spikes of yellowish decandrous flowers, the inferior ones castrated; succeeded above by oblong seed-pods. This sort, though naturally shrubby and perennial in its native soil, yet in this country it sometimes decays in winter. It is only sensitive in the foliola, but quick in the motion.

6. The *Viva*, lively mimosa, or smallest sensitive weed, has many creeping roots, and spreads itself so as to cover large spots of ground. It rises at most to two inches, has winged leaves, with numerous small pinnæ. The flower is globular, of a bluish colour, and grows in clusters from the axillæ: these are followed by little, short, hairy, pods, containing smooth shining seeds. This is the most sensible of all the *mimosas*, the *pudica* not excepted. By running a stick over the plant, a person may write his name, and it will remain visible for ten minutes.

7. The *Quadrivalvis*, perennial, or quadrivalve humble

Mimosa.

Mimosa has herbaceous, slender, quadrangular, prickly stems, branching and spreading all around, armed with recurved spines; bipinnated leaves of two or three pair of winged lobes, having each many pinnæ; and at the axillæ globular heads of purple flowers, succeeded by quadrivalvular pods. This is of the humble sensitive kind, both leaves and footstalks receding from the touch.

8. The *Plena*, annual, or double-flowered sensitive mimosa, rises with an herbaceous, erect, round, unarmed stem, closely branching and spreading every way, three or four feet high; bipinnated leaves of four or five pair of winged lobes, of many pairs of pinnæ; and at the axillæ and termination of the branches spikes of yellow pentandrous flowers, the lower ones double; succeeded by short broad pods. This annual is only sensitive in the foliola, but extremely sensible of the touch or air.

9. The *Cornigera*, or horned Mexican mimosa, commonly called *great horned acacia*, has a shrubby, upright, deformed stem, branching irregularly, armed with very large, horn-like white spines, by pairs, connated at the base; bipinnated leaves thinly placed; and flowers growing in spikes. This species is esteemed a curiosity for the oddity of its large spines, resembling the horns of animals, and which are often variously wreathed, twisted, and contorted.

10. The *Farnesiana*, or fragrant acacia, grows in woodlands and waste lands in most parts of Jamaica; rising to 25 or 30 feet, with suitable thickness. The bark of the trunk is brown and scaly, the branches are alternate. It is adorned with bipinnated leaves of a bright green colour; and yellow globular flowers from the axillæ, of a fragrant smell. The pods are about three inches long, and half an inch broad: they are of a light brown colour, smooth, compressed, and contain five or six smooth flat seeds. Formerly the flowers of this tree were used as an ingredient in the *theriaca andromachi* of the old dispensaries. The tree is sometimes planted for a hedge or fence round inclosures; and the timber, though small, is useful in rural economy.

11. The *Arborea*, or wild tamarind tree, is common in all the woodlands, and especially near where settlements have been made, in Jamaica. It rises to a considerable height, and is proportionably thick. The timber is excellent, and serves many purposes in rural economy: it is of the colour of cedar, pretty hard, and takes a good polish. The leaves are numerous; the flowers globular and white. The pods are about a foot in length, of a fine scarlet colour; when they are ripe they open and become twisted. The seeds then appear; they are oblong, smooth, of a shining black, and quite soft. On the whole, from the leaves, flowers, and pods, this tree exhibits a singular and beautiful contrast. With us this plant is raised in hot-houses; but it appears, that with a little pains it may be made to grow in the open air. A good sizeable tree of this sort grew in the garden of the late Dr William Pitcairn, at Islington, near London.

12. The *Latifolia*, shag-bark, or white wild tamarind. This excellent timber tree is very common in Jamaica, and rises to a moderate height and good thickness. The trunk is rough and scaly: The leaves are

numerous, of a rhomboidal figure, and yellowish cast. The flower-spikes are from the axillæ; their colour is yellow. The seed-vessels are flat, jointed, and twisted. The seeds are of the bigness of a vetch, white, and finely streaked with blue.

Of this tree there is a variety which some botanists call *M. serpentina*. The chief difference is in the leaves, which are smaller, and of a shining dark green.

13. The *Lebeck*, or ebony tree. This is a native of the East Indies, but raised from seeds in Jamaica and St Vincent's. It is figured, though not accurately, by Plukenet, Tab. 331. fig. 1. To what height this tree grows, we cannot yet say; but it must be of a considerable thickness if it be the ebony we have in use here. Time will soon determine this, as the few plants in the islands are reared with great care by Dr Dancer in Jamaica, and Mr Alexander Anderson in St Vincent's.

14, 15. The *Cinerea* α;—β *Pinnata*? Cashaw bushes. These species are common about Kingston and Spanish town Jamaica, and rise by slender trunks to about 20 feet.

Dr Roxburgh of Madras, amongst a number of useful discoveries, has found the lac insect on this species of mimosa*. We have seen the native gum-lac on one of the small twigs, and a specimen of the plant in the collection of a gentleman here. The plant is a variety of the cinerea, and appears rather to be the *M. pinnata*, Lin. It is to be hoped, that in a short time the useful insect just mentioned may be transported from Asia to the West Indies, where this gum, or rather wax, may be also produced.

16. The *Scandens*, cacoons, or masootoo wyth (*Gigalobium scandens*, Browne's Jam. p. 362. *Phaseolus maximus perennis*, Sloane's Cat. 68. *Perein Kaku-valli*, H. M. viii. T. 32, 3, 4.) This species of mimosa is frequent in all the upland valleys and woodlands on the north side of Jamaica. It climbs up the tallest trees, and spreads itself in every direction by means of its *cirrh*i or claspers, so as to form a complete arbour, and to cover the space of an English acre from one root. This circumstance has a bad effect on the trees or bushes so shaded. Light, air, and rain (so necessary for all plants), being shut out, the leaves drop off, the tree gradually rots, and the limbs fall down by the weight of this parasite.

Several authors have mentioned the cocoon; but their descriptions of the plant, and particularly the figures, are erroneous. On that account we have given a figure from the herbarium of a gentleman long resident in Jamaica; and the following are the characters, transcribed from his field notes.

Folia conjugata. Petioli communis longi oppositi *cirrho* terminali. Pinnæ quadrijugæ vel duodecim jugæ, oblongæ apice obtusæ nitidæ utrinque glabræ. *Cirrh*us longus contortus apice bifidus. Spicæ axillares erectæ, longissimæ, multifloræ floribus parvis, colore viride flavo. Calyx quinque-dentatus minimus. Corolla pentapetala, erecta, parva. Filamenta numerosa, e basi corollæ, et eodem longitudine. Antheræ globosæ erectæ. Stylus filiformis, tortus, longitudine staminum. Stigma simplex. Legumen maximum, lignosum durum, 5 vel 8-pedale longum et 4-5 unciarum latitudine, varie contortum, compressum, bivalve.

Mimosa.

Semina plura, circiter decem vel quindecim numero, orbiculata, subcompressa, cortice duro, nitidofusco. *Hilo* nigro breve.

The roots of this plant run superficially under the ground or herbage. The trunk is seldom thicker than a man's thigh, and sends off many branches, with numerous shining green leaves, each of which terminates in a tendril or clasper, that serves to fasten it to trees or bushes. The flower-spikes are from the axillæ: they are slender, and the florets on them small and numerous. The pod is perhaps the largest and longest of any other in the world; being sometimes eight or nine feet in length, five inches broad, jointed, and containing 10 or 15 seeds. These seeds are brown, shining, flattened, and very hard, and called *cocoons*. They are the same mentioned in the Philosophical Transactions, n° 222. page 298. by Sir Hans Sloane, as being thrown ashore on the Hebrides and Orkneys. This happens in the following manner: The seeds or beans fall into the rivers, and are conveyed to the sea. The trade-winds carries them westward till they fall into the gulf stream, which forces them northward along the coast of America and Bahama islands. As the winds blow frequent and strong from America, these seeds are driven to the eastward, till at length they are thrown ashore and left with the tide as aforesaid.

This bean, after being long soaked in water, is boiled and eaten by some negroes; but, in general, there seems to be no other use made of it than as a sort of snuff-box.

† *Med. Obs. and Inquir.*
Vol. V.
p. 151, &c.

Plate
CCCXI.
fig. 2.

17. The *Catechu*, according to Mr Ker†, grows only to 12 feet in height, and to one foot in diameter; it is covered with a thick rough brown bark, and towards the top divides into many close branches: the leaves are bipinnated, or doubly winged, and are placed alternately upon the younger branches: the partial pinnæ are nearly two inches long, and are commonly from 15 to 30 pair, having small glands inserted between the pinnæ: each wing is usually furnished with about 40 pair of pinnulæ or linear lobes, beset with short hairs: the spines are short, recurved, and placed in pairs at the bases of each leaf: the flowers are hermaphrodite and male, and stand in close spikes, which arise from the axillæ of the leaves, and are four or five inches long: the calyx is tubular, hairy, and divides at the limb into five oval pointed segments: the corolla is monopetalous, whitish, and of the same form as the calyx, but twice its length: the filaments are numerous, capillary, double the length of the corolla, adhering at the base of the germen, and crowned with roundish antheræ: the germen is oval, and supports a slender style, which is of the length of the filaments, and terminated by a simple stigma: the fruit, or pod, is lance-shaped, brown, smooth, compressed, with an undulated thin margin; it contains six or eight roundish flattened seeds which produce a nauseous odour when chewed. From this tree, which grows plentifully on the mountainous parts of Indostan, where it flowers in June, is produced the officinal drug long known in Europe by the name of *terra japonica*; for the history and preparation of which, see the article *TERRA Japonica*.

18. The *Nilotica*, or true Egyptian acacia, rises to a greater height than the preceding: the bark of the

trunk is smooth, and of a grey colour; that of the branches has commonly a purplish tinge: the leaves are bipinnated, and placed alternately: the partial pinnæ are opposite, furnished with a small gland between the outermost pair, and beset with numerous pairs of narrow elliptical pinnulæ, or leaflets: the spines are long, white, spreading, and proceed from each side of the base of the leaves: the flowers are hermaphrodite and male; they assume a globular shape, and stand four or five together upon slender peduncles, which arise from the axillæ of the leaves: the calyx is small, bell-shaped, and divided at the mouth into five minute teeth: the corolla consists of five narrow yellowish segments: the filaments are numerous, capillary, and furnished with roundish yellow antheræ: the germen is conical, and supports a slender style, crowned with a simple stigma: the fruit is a long pod, resembling that of the lupin, and contains many flat-tish brown seeds. It is a native of Arabia and Egypt, and flowers in July.

Although the *mimosa nilotica* grows in great abundance over the vast extent of Africa, yet gum arabic is produced chiefly by those trees, which are situated near the equatorial regions; and we are told that in Lower Egypt the solar heat is never sufficiently intense for this purpose. The gum exudes in a liquid state from the bark of the trunk and branches of the tree, in a similar manner to the gum which is often produced upon the cherry-trees &c. in this country; and by exposure to the air it soon acquires solidity and hardness. In Senegal the gum begins to flow when the tree first opens its flowers; and continues during the rainy season till the month of December, when it is collected for the first time. Another collection of the gum is made in the month of March, from incisions in the bark, which the extreme dryness of the air at that time is said to render necessary. Gum arabic is now usually imported into England from Barbary; not packed up in skins, which was the practice in Egypt and Arabia, but in large casks or hogsheds. The common appearance of this gum is well known; and the various figures which it assumes seem to depend upon a variety of accidental circumstances attending its transudation and concretion. Gum Arabic of a pale yellowish colour is most esteemed; on the contrary, those pieces which are large, rough, of a roundish figure, and of a brownish or reddish hue, are found to be less pure, and are said to be produced from a different species of *mimosa* (*M. Senegal*); but the Arabian and Egyptian gum is commonly intermixed with pieces of this kind, similar to that which comes from the coast of Africa near the river Senegal.

Gum-arabic does not admit of solution by spirit or oil, but in twice its quantity of water it dissolves into a mucilaginous fluid, of the consistence of a thick syrup; and in this state answers many useful pharmaceutical purposes, by rendering oily, resinous, and pinguious substances, miscible with water. The glutinous quality of gum Arabic is preferred to most other gums and mucilaginous substances, as a demulcent in coughs, hoarsenesses, and other catarrhal affections, in order to obtund irritating acrimonious humours, and to supply the loss of abraded mucus. It has been very generally employed in cases of ardor urinæ and strangu-

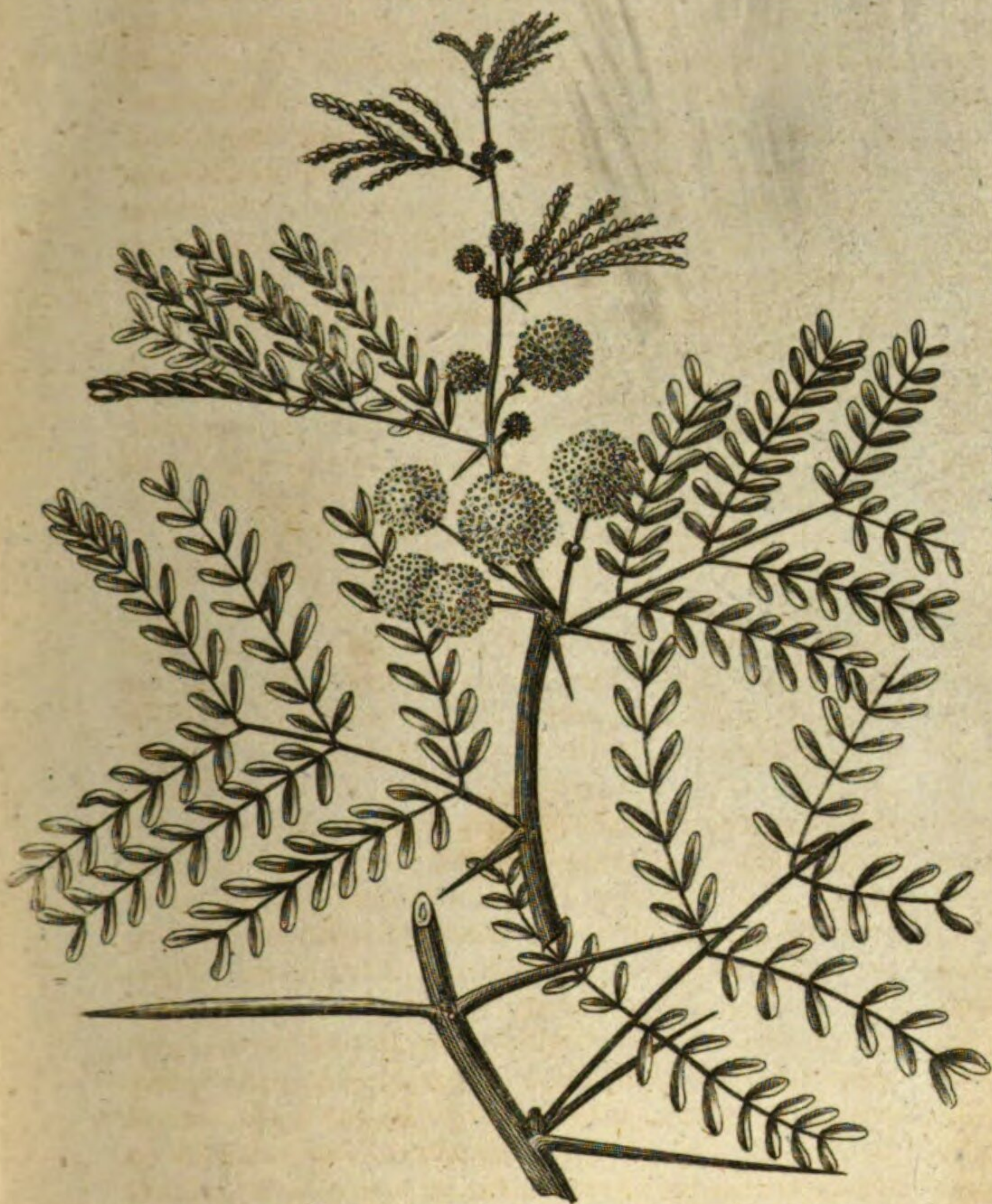
Mimosa.

Plate
CCCXI.
fig. 1.

Mimosa.

Plate CCCXI.

Mimosa nilotica.



Mimosa Catechu



Mimosa Cinerea.



Mimosa Scandens.



Mimosa (non-descript)

Plate CCCXII.



Copied from Capt. Paterson's Travels.

Abell Pin. Wal. Sculp. fecit.

Mimosa,
Mina.

ary: but it is the opinion of Dr Cullen, "that even this mucilage, as an internal demulcent, can be of no service beyond the alimentary canal." See farther the article *GUM Arabic*.

19. The *Senegal* is a native of Guinea, and was some time ago introduced into Jamaica. Dr Wright tells us, he saw both this and the *mimosa nilotica*, of the size of a cherry tree, growing at Dr Paterfon's in the parish of Hanover, Jamaica. The flowers are globular, yellow, and fragrant. The pods are brown, and of the size of a goose-quill. The tree, on being wounded, exfudes gum arabic, though in less quantity, and less transparent, than that of the shops, which is obtained from the *nilotica* above described.

There are above 40 other species characterised in the *Systema Vegetabilium*.

On Plate CCCXII. is figured a new species, of an uncommon size, mentioned by Mr Paterfon in his Travels among the Hottentots, but not particularly described. Like several of the other *mimosas*, it produces gum, which is considered by the natives as a peculiarly delicate species of food: the leaves and lower points of the branches seem to constitute the principal aliment of the camelopardalis; and, from the extent of its boughs, and the smoothness of the trunk, it affords a sufficient defence to a species of gregarious bird against the tribe of serpents and other reptiles which would otherwise destroy its eggs. See the article *LOXIA*.

† Travels,
Vol. V.
P. 34, 35.

Mr Bruce † describes two plants which seem referable to this genus; the one named *ergett el dimmo*, the other *ergett el krone*.

The former, in our author's opinion, should be named *mimosa sanguinea*; its name in the Abyssinian language signifying *the bloody ergett*, and derived, as he supposes, from its being partly composed of beautiful pink filaments. When the blossoms are fully spread, the upper part of them consists of yellow curled filaments, and the under part of pink filaments of a similar shape. In its unripe state, that part which afterwards becomes pink is of a green colour, and composed of tubercles of a larger size, and more detached than those which afterwards produce the yellow filaments; the latter being smaller, and closer set together: the leaves are of the double-pinnated kind.

The name of the other species, in the Abyssinian language, signifies *the horned ergett*; which our author supposes to be given it on account of the figure of the pods. The flower very much resembles that of the *acacia vera* in size and shape, excepting that it is attached to the branch by a strong woody stalk of considerable length, which grows out at the bottom of the branch bearing the leaves, and is sheltered as in a case by the lower part of it. The branches are all covered with short, strong, and sharp-pointed thorns, having their points inclined backwards towards the root. The pods are covered with a prickly kind of hair, which easily rubs off with the fingers, sticks to them, and gives a very uneasy sensation. They have thirteen divisions; in each of which are three hard, round, and shining seeds, of a dusky brown colour.

Both of these shrubs shut their leaves on the coming on of the violent rains in the wet season, and never fully expand them till the dry season returns.

MINA, or MANEH, a species of money, which pro-

perly signifies *one part or ounce*. It is observed that this word occurs only in the books of Kings, Chronicles, Ezra, and Ezekiel. This prophet (xlv. 12.) tells us, that the minah or maneh was valued at 60 shekels, which in gold make of our English money about 54½ pounds, and in silver almost seven pounds. Thus for the Hebrew maneh. But the Greek or Attic mina, which is probably that mentioned in the books of the Maccabees and in the New Testament, is valued at 100 drachmæ, or about 21 17s. sterling. There was also a lesser mina, which was valued at 75 drachmæ.

MINAGNGHINIM, a pulsatile instrument of music, among the Hebrews, which was a square table of wood, fitted with a handle; over this table was stretched an iron chain, or hempen cord, passing thro' balls of wood or brass, which struck against the table, when the instrument was shook, and occasioned a clear sound, which might be heard at a great distance. See Kircher's figure of it in Plate CCCXIV.

MINCHA, in the Jewish customs, offerings of meal, cakes, or biscuits, made in the temple of the Lord. The Seventy have sometimes preserved this word in their translation; but instead of *mincha* they read *manaa*, which doubtless was the received pronunciation in their time. We find *manaa* in the same sense, in Baruch i. 10. Levit. ii. 3. &c. See the Greek of Jerem. xvii. 26. Dan. ii. 46. 2 Kings, viii. 5, 9, xvii. 7. xx. 12. 2 Chron. vii. 7. Nehem. xiii. 5, 9, &c.

MINCHING-HAMPTON, a town of Gloucestershire, 20 miles from Bath and Bristol, and near 90 from London, with a market on Tuesdays, and two fairs. The parish is pretty large, being bounded on the north by the Stroud, and on the south by the brook Avening; and has 12 hamlets belonging to it, with a common called Amberley. Here is a good large rectory church, built in form of a cross, and worth 200 l. a-year. Near it are very large camps, with deep trenches; and near Dunkirk in this parish are fulling mills.

MINCIUS, a river of the Transpadana; running from, or rather transmitted through, the Lacus Benacus, from north to south, into the Padus; but originally rising in the Rhetian Alps. Now Mincio or Menzo, running through the duchy of Mantua into the Po.

MIND, a thinking intelligent being, otherwise called *spirit*, in opposition to matter or body. See METAPHYSICS, Part III.

MINDANOA, or MAGINDANAO, a large island of Asia in the East Indies, and one of the Philippines; 160 miles in length, and 120 in breadth. The interior parts contain several chains of lofty mountains, between which are extensive plains, where vast herds of cattle roam at large in the most delicious pastures. Several deep valleys also intersect, as it were, certain parts of the country, through which, during the rainy seasons, vast torrents pour from the mountains, and force their impetuous way to the sea. The rains and vapours which lodge in the plains diffuse themselves into meandering rivulets, and, collecting a variety of small streams in their course, approach the sea in the form of considerable rivers.—The sovereign of Magindanao is a powerful prince, and has several inferior chiefs, who
acknow-

Minagn-
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Mindanao.

Meares's
Voyages.

Mindanao, acknowledge him as their head. Nevertheless, there are others of them who refuse submission to him, and are consequently in a continual state of war; so that peace, at least, does not appear to be one of the blessings of this island. The Spaniards, indeed, assert their right to the entire dominion of Magindanao; but it is mere assertion; for though they have forts, &c. on the island, it is by no means in a state of subjection to their nation.

The air is esteemed salubrious, particularly in the vicinity of the sea. The heat there is not, in any degree, so intense as might be expected in a country which is situated on the very verge of the torrid zone. The prevalence of the easterly winds, in that part of the coasts which is washed by the Pacific Ocean, renders the air cool and pleasant, the trade-wind blowing incessantly on its shores. It acts, indeed, with so much power as to sweep the whole breadth of the island; and though in its passage it loses much of its strength, it retains a sufficient degree of force to afford refreshing breezes to the inhabitants of the western shore. The interior parts are much colder, from a very cloudy atmosphere, which frequently hangs over the summits of the mountains in thick and humid vapours. The soil, which is very exuberant, is suited to the cultivation of the whole vegetable tribes. Rice is produced in the greatest abundance; a *pecul*, or 133 pounds, may be purchased for a Spanish dollar. Every part of the island abounds with buffaloes, cows, hogs, goats, &c. It affords also great variety of fowls, and a species of duck, whose head is of a fine scarlet colour. Here are also a small breed of horses, remarkable for their spirit. The natives, however, principally employ buffaloes in the various branches of husbandry and agriculture.

The city of Magindanao is situated on the south-east side of the island, has a river capable of admitting small vessels, and carries on a considerable trade with Manilla, Sooloo, Borneo, and the Moluccas. Their exports are rice, tobacco, bees-wax, and spices; in return for which they receive coarse cloths of Coromandel, China ware, and opium. The village or town of Samboingan is situated on the banks of a small rivulet, which empties itself immediately into the sea, and is agreeably shaded by groves of cocoa-trees. The number of its inhabitants are about 1000, among which are included the officers, soldiers, and their respective families. In its environs there are several small look-out houses, erected on posts of twelve feet high, in all of which a constant guard is kept; so that it appears as if the Spaniards were in a continual state of enmity with the natives. The houses are built of those simple materials which are of very general use in the eastern seas. They are erected on posts, and built of bamboo, covered with mats; the lower apartments serve for their hogs, cattle, and poultry, and the upper ones are occupied by the family."

MINDELHEIM, a town of Germany, in the circle of Suabia, and in Algow, with a castle. It is capital of a small territory between the rivers Iller and Lech, subject to the house of Bavaria. It was taken by the Imperialists after the battle of Hochstet, who erected it into a principality in favour of the duke of Marlborough; but it returned back to the house of Bavaria by the treaty of Rastat. It is

33 miles south-east of Ulm. E. Long. 10. 40. N. Lat. 48. 5. **Minden** || **Mine.**

MINDELHEIM, a district of Germany, in Suabia, lying between the bishopric of Augsburgh and the abbacy of Kempten, which is 20 miles in length and 16 in breadth.

MINDEN, a considerable town of Germany in the circle of Westphalia; and capital of a territory of the same name; seated on the river Weser, which renders it a trading-place. It belongs to the king of Prussia, who has secularized the bishopric. It is 27 miles east-by-south of Osnaburg, and 37 west of Hanover. E. Long. 9. 5. N. Lat. 52. 22.

MINDEN (the principality of), in Germany, lies in the circle of Westphalia, to the north of the county of Ravensberg, and along each side of the river Weser. It is about 22 miles square, and Minden and Petershagen are the principal places. It was formerly a bishopric, but is now secularised; and was ceded to the elector of Brandenburg by the treaty of Westphalia.

MINDORA, an island of Asia, in the East Indies, and one of the Philippines, 50 miles in circumference, and separated from Luconia by a narrow channel. It is full of mountains, which abound in palm-trees and all sorts of fruits. The inhabitants are idolaters, and pay tribute to the Spaniards, to whom this island belongs.

MINE, in natural history, a deep pit under ground, from whence various kinds of minerals are dug out; but the term is more particularly applied to those which yield metals. Where stones only are procured, the appellation of *quarries* is universally bestowed upon the places from which they are dug out, however deep they may be.

The internal parts of the earth, as far as they have been yet investigated, do not consist of one uniform substance, but of various *strata* or beds of substances, extremely different in their appearances, specific gravities, and chemical qualities, from one another. Neither are these strata similar to one another either in their nature or appearance in different countries; so that even in the short extent of half a mile, the strata will be found quite different from what they are in another place. As little are they the same either in depth or solidity. Innumerable cracks and fissures, by the miners called *lodes*, are found in every one of them; but these are so entirely different in size and shape, that it is impossible to form any inference from their size in one place to that in another. In these lodes or fissures the metallic ore is met with; and, considering the great uncertainty of the dimensions of the lodes, it is evident that the business of mining, which depends on that size, must in like manner be quite uncertain and precarious. Mr Price, in his treatise on the Cornish mines, observes, that "the comparative smallness of the largest fissures to the bulk of the whole earth is really wonderful. In the finest pottery we can make, by a microscopic view, we may discover numerous cracks and fissures, so small as to be impenetrable by any fluid, and impervious to the naked eye;" as, by the laws of nature originally imposed by the Creator, it happens that matter cannot contract itself into solid large masses, without leaving fissures between them, and yet the very fissures are as necessary

Mine.

necessary and useful as the strata through which they pass. They are the drains that carry off the redundant moisture from the earth; which, but for them, would be too full of fens and bogs for animals to live or plants to thrive on. In these fissures, the several ingredients which form *lodes*, by the continual passing of waters, and the menstrua of metals, are brought out of the adjacent strata, collected and conveniently lodged in a narrow channel, much to the advantage of those who search for and pursue them; for if metals and minerals were more dispersed, and scattered thinly in the body of the strata, the trouble of finding and getting at them would be endless, and the expence of procuring them exceed the value of the acquisition.

The insides of the fissures are commonly coated over with a hard, crystalline, earthy substance or rind, which very often, in the breaking of hard ore, comes off along with it, and is commonly called the *capels* or *walls* of the lode: but Mr Price is of opinion, that the proper walls of the lode are the sides of the fissure itself, and not the coat just mentioned, which is the natural plaster upon those walls, furnished perhaps by the contents of the fissures, or from oozings of the surrounding strata.

The breadth of a lode is easily known by the distance betwixt the two incrustated sides of the stones of ore; and if a lode yields any kind of ore, it is a better sign that the walls be regular and smooth, or at least that one of them be so, than otherwise; but there are not many of these fissures which have regular walls until they have been sunk down some fathoms.

Thus the inner part of the fissure in which the ore lies, is all the way bounded by two walls of stone, which are generally parallel to one another, and include the breadth of the vein or lode. Whatever angle of inclination some fissures make in the solid strata at their beginning, they generally continue to do the same all along. Some are very uncertain in their breadth, as they may be small at their upper part and wide underneath, and *vice versa*. Their regular breadth, as well as their depth, is subject to great variation; for though a fissure may be many fathoms wide in one particular place, yet a little further east or west it may not perhaps be one inch wide. This excessive variation happens generally in very compact strata, when the vein or fissure is squeezed, as it were, through hard rocks which seem to compress and straiten it. A true vein or fissure, however, is never entirely obliterated, but always shows a string of metallic ore or of a veiny substance; which often serves as a leader for the miners to follow until it sometimes leads them to a large and richly impregnated part. Their length is in a great measure unlimited, though not the space best fitted for yielding metal. The richest state for copper, according to Mr Price, is from 40 to 80 fathoms deep; for tin, from 20 to 60; and though a great quantity of either may be raised at 80 or 100 fathoms, yet "the quality (says our author) is often too much decayed and dry for metal."

Mr Price informs us, that the fissures or veins of the Cornish mines extend from east to west; or, more properly, one end of the fissure points west and by

south, or west and by north; while the other tends east and by south, or east and by north. Thus they frequently pass through a considerable tract of country with very few variations in their directions, unless they be interrupted by some intervening cause.—But, besides this east and west direction, we are to consider what the miners call the *underlying* or *bade* of the vein or lode; viz. the deflection or deviation of the fissure from its perpendicular line, as it is followed in depth like the slope of the roof of a house, or the descent of the steep side of a hill. This slope is generally to the north or south; but varies much in different veins, or sometimes even in the same vein: for it will frequently slope or underlie a small space in different ways, as it may appear to be forced by hard strata on either side.—Some of the fissures do not vary much from a perpendicular, while some deviate more than a fathom; that is, for every fathom they descend in perpendicular height, they deviate likewise as much to the south or north. Others differ so much from the perpendicular, that they assume a position almost horizontal; whence they are also called *horizontal* or *flat lodes*, and sometimes *lode plots*. Another kind of these has an irregular position with regard to the rest; widening horizontally for a little way, and then descending perpendicularly almost like stairs, with only a small string or leader to follow after; and thus they alternately vary and yield ore in several flat or horizontal fissures. This, by the Cornish tanners, is called (but in Mr Price's opinion erroneously) a *floor* or *squat*; which, properly speaking, is a hole or chasm impregnated with metal, making no continued line of direction or regular walls. Neither does a floor of ore descend to any considerable depth; for underneath it there appears no sign of a vein or fissure, either leading directly down or any other way. This kind of vein is very rare in Britain. The fissures most common in Britain are the perpendicular and inclined, whether their direction be north or south, east or west.

The perpendicular and horizontal fissures (according to our author) probably remain little altered from their first position, when they were formed at the induration of the strata immediately after the waters left the land. The perpendicular fissures are found more commonly situated in level ground, at a distance from hills, and from the sea-shore; but with regard to the latter, we find that the upper and under masses of strata differ in their solidity and other properties. "Hence, (says our author) it is very plain, that inclined fissures owe their deflection or underlie to some secondary cause, violence, or subsidence, of the earth: for though perpendicular fissures are seldom to be seen, yet such as are inclined at very considerable depths, become more and more perpendicular as the more central strata, by reason of the vast superincumbent weight, do not seem so likely to be driven out of their position as those which lie nearer the surface."

The fissures are often met with fractured as well as inclined; the reason of which, in Mr Price's opinion, has been a subsidence of the earth from some extraordinary cause. "The original position (says he) must have been horizontal, or parallel to the surface of the earth: but we often find these strata very sensibly declined from that first position; nay, some-

Mine.

times

Mine.

times quite reversed, and changed into perpendicular. When we see a wall lean, we immediately conclude that the foundation has given way, according to the angles which the wall makes with the horizon; and when we find the like declination in strata, we may conclude, by parity of reason, that there has been a like failure of what supported them, in proportion to that declination; or that whatever made the strata to fall so much awry, must also cause every thing included in those strata to fall proportionably. Wherever the greatest subsidence is to the north, the top of the lode or fissure will point to the north, and of consequence underlie to the south, and *vice versa*: the slide or heave of the lode manifests the greater subsidence of the strata; but the same lode is frequently fractured and heaved in several places: all of which, by due observation, will show us they were occasioned by so many several shocks or subsidencies, and that the strata were not unfooted, shaken, or brought to fall once only or twice, but several times."

Mr Price, in the course of his work, observes, that though the metallic veins generally run from east to west, they are frequently intersected by veins or *lodes*, as he calls them, of other matters, which run from north to south. Some of these cross veins contain lead or antimony, but never tin or copper. Sometimes one of these unmetallic veins intersects the true one at right angles, sometimes obliquely; and sometimes the mixture of both is so intimate, that the most expert miners are at a loss to discover the separated part of the true vein. When this last is intercepted at right angles, it is moved, either north or south, a very little way, perhaps not more than one fathom; in which case, the miners having worked to a small distance in one of these directions, if they find themselves disappointed, turn to the other hand, and seldom fail of meeting with what they expected. Sometimes they are directed in their search by the pointing of a rib or string of the true vein; but when the interruption happens in an oblique direction, the difficulty of finding the vein again is much greater.

When two metallic veins in the neighbourhood of each other run in an oblique direction, and of consequence meet together, they commonly produce a body of ore at the place where they intersect; and if both are rich, the quantity will be considerable; but if one be poor and the other rich, then both are either enriched or impoverished by the meeting. After some time they separate again, and each will continue its former direction near to the other; but sometimes, though rarely, they continue united.

It is a sign of a poor vein when it separates or diverges into strings; but, on the contrary, when several of them are found running into one, it is accounted a promising sign. Sometimes there are branches without the walls of the vein in the adjacent strata, which often come either obliquely or transversely into it. If these branches are impregnated with ore, or if they underlie faster than the true vein, that is, if they dip deeper into the ground, then they are said to overtake or come into the lode, and to enrich it; or if they do not, then they are said to go off from it, and to impoverish it. But neither these nor any other marks either of the richness or poverty of a mine are to be entirely depended upon: for many mines, which have

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a very bad appearance at first, do nevertheless turn out extremely well afterwards; while others, which in the beginning seemed very rich, turn gradually worse and worse: but in general, where a vein has a bad appearance at first, it will be imprudent to be at much expence with it.

Veins of metal, as has been already observed, are frequently, as it were, so compressed betwixt hard strata, that they are not an inch wide; nevertheless, if they have a string of good ore, it will generally be worth while to pursue them; and they frequently turn out well at last, after they have come into softer ground. In like manner, it is an encouragement to go on if the branches or leaders of ore enlarge either in width or depth as they are worked; but it is a bad sign if they continue horizontal without inclining downwards; though it is not proper always to discontinue the working of a vein which has an unfavourable aspect at first. Veins of tin are worth working when only three inches wide, provided the ore be good; and copper ores when six inches wide will pay very well for the working. Some of the great mines, however, have very large veins, with a number of other small ones very near each other. There are also veins crossing one another sometimes met with, which are called *contras*, vulgarly *caunters*. Sometimes two veins run down into the ground in such a manner that they meet in the direction of their depth; in which case, the same observations apply to them which are applicable to those that meet in an horizontal direction. Sometimes a vein will suddenly disappear without giving any warning, by becoming narrower, or of worse quality; which by the miners is called a *start* or *leap*, and is very common in the mines of Cornwall. In one day's time they may thus be disappointed in the working of a rich vein of tin, and have no further sign of any thing to work upon: at the fractured extremity of their vein they perceive a body of clay or other matter; and the method of recovering their vein is to drive on their work in the direction of the former part, so that their new work shall make the same angle with the clay that the other part of the vein does. Sometimes they sink a shaft down from the surface; but it is generally a matter of difficulty to recover a vein when thus lost.

The method of discovering mines is a matter of so much difficulty, that it seems surprising how those who were totally unacquainted with the nature of metals first came to think of digging them out of the earth. According to Lucretius, the discovery was made by the conflagration of certain woods, which melted the veins of metal in the earth beneath them; but this seems to be rather improbable. Aristotle, however, is of the same opinion with Lucretius, and tells us, that some shepherds in Spain having set fire to the woods, the earth was thus heated to such a degree, that the silver near the surface of it melted and flowed into a mass; and that in a short time the metallic mass was discovered by the rending of the earth in the time of an earthquake: and the same story is told by Strabo, who ascribes the discovery of the mines of Andalusia to this accident. Cadmus is said by some to have been the first who discovered gold: while others ascribe this to Thoas the Thracian, to Mercury the son of Jupiter, or to Pifus king of

Mine.

Mine. of Italy; who having left his own country, went into Egypt, where he was elected king after the death of Mizraim the son of Ham; and, on account of his discovery, was called the *Golden God*. Others say, that *Eaelis* or *Cæacus* the son of Jupiter, or Sol the son of Oceanus, was the first discoverer; but *Æschylus* attributes the discovery not only of gold, but of all other metals, to Prometheus. The brass and copper mines in Cyprus were first discovered by Cinyra the son of Agryopa; and Hesiod ascribes the discovery of the iron mines of Crete to the Cretan Dactyli Idæi. The extraction of lead or tin from its ore in the island of Cassiteris, according to several ancient authors, was discovered by Midacritus.—The scripture, however, ascribes the invention of brass and iron, or at least of the methods of working them, to Tubal Cain before the flood.

In more modern times, we know that mines have been frequently discovered by accident; as in sea-cliffs, among broken craggy rocks, by the washing of the tides or floods, also by irruptions and torrents of water issuing out of hills and mountains, and sometimes by the wearing of high roads. Mr Price mentions another way by which mines have been discovered, *viz.* by fiery coruscations; which, he says, he has heard from persons whose veracity he is unwilling to question. "The tanners (says he) generally compare these effluvia to blazing stars or other whimsical likenesses, as their fears or hopes suggest; and search with uncommon eagerness the ground over which these jack-a-lanterns have appeared and pointed out. We have heard but little of these phenomena for many years; whether it be, that the present age is less credulous than the foregoing, or that the ground, being more perforated by innumerable new pits sunk every year, some of which, by the flannery laws, are prevented from being filled up, has given these vapours a more gradual vent, it is not necessary to inquire, as the fact itself is not generally believed."

Mines, however, are now most commonly discovered by investigating the nature of such veins, ores, and stones, as may seem most likely to turn to account: but there is a particular sagacity, or habit of judging from particular signs, which can be acquired only by long practice. Mines, especially those of copper, may also be discovered by the harsh and disagreeable taste of the waters which issue from them; though it is probable that this only happens when the ore lies above the level of the water which breaks out; for it does not seem likely that the taste of the ore could ascend, unless we were to suppose a pond or lake of water standing above it. The presence of copper in any water is easily discovered by immersing in it a bit of polished iron, which will thus instantly be turned of a copper colour, by reason of the precipitation of the metal upon it. A candle, or piece of tallow put into water of this kind, will in a short time be tinged of a green colour.

Another and still more remarkable method of discovering mines is said to be by the *virgula divinatoria*, or "divining rod;" which, however incredible the stories related concerning it may be, is still relied on by some, and among others by Mr Price. It is not known who was the inventor of this method; but Agricola supposes that it took its rise from the magi-

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cians, who pretended to discover mines by enchantment. No mention is made of it, however, before the 11th century, since which time it has been in frequent use; and the Corpuscular Philosophy has even been called in to account for it. But before we pretend to account for phenomena so very extraordinary as those reported of the *virgula divinatoria*, it is necessary, in the first place, to determine whether or not they exist. Mr Price, as has been already hinted, believes in it, though he owns that by reason of his constitution of mind and body he is almost incapable of co-operating with its influence. The following account, however, he gives from Mr William Cookworthy of Plymouth, a gentleman of known veracity and great chemical abilities.

He had the first information concerning this rod from one Captain Ribeira, who deserted from the Spanish service in Queen Anne's reign, and became captain-commandant in the garrison of Plymouth; in which town he satisfied several intelligent persons of the virtues of the rod, by many experiments on pieces of metal hid in the earth, and by an actual discovery of a copper mine near Oakhampton, which was wrought for some years. This captain very readily showed the method of using the rod in general, but would not by any means discover the secret of distinguishing the different metals by it; though, by a constant attention to his practice, Mr Cookworthy discovered it. Captain Ribeira was of opinion, that the only proper rods for this purpose were those cut from the nut or fruit-trees; and that the virtue was confined to certain persons, and those, comparatively speaking, but few: but Mr Price says, that the virtue resides in all persons and in all rods under certain circumstances. "The rod (says he) is attracted by all the metals, by coals, limestone, and springs of water, in the following order: 1. Gold; 2. Copper; 3. Iron; 4. Silver; 5. Tin; 6. Lead; 7. Coals; 8. Limestone and springs of water. One method of determining the different attractions of the rod is this: Stand, holding the rod with one foot advanced; put a guinea under that foot, and an halfpenny under the other, and the rod will be drawn down; shift the pieces of money, and the rod will be drawn towards the face, or backwards to the gold, which proves the gold to have the stronger attraction.

"The rods formerly used were shoots of one year's growth that grew forked; but it is found, that two separate shoots tied together with packthread or other vegetable substance answer rather better than such as are naturally forked, as the shoots of the latter are seldom of an equal size. They are to be tied together by the greater ends, the small ones being held in the hands. Hazle rods cut in the winter, such as are used for fishing rods, and kept till they are dry, do best; though, where these are not at hand, apple-tree suckers, rods from peach-trees, currants, or the oak, though green, will answer tolerably well."

Our author next proceeds to describe the manner of holding the rod; of which he gives a figure, as he says it is difficult to be described. The small ends being crooked, are to be held in the hands in a position flat or parallel to the horizon, and the upper part in an elevation not perpendicular to it, but at an angle of about 70 degrees. "The rod (says he) being properly

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Mine.

perly held by those with whom it will answer, when the toe of the right foot is within the semidiameter of the piece of metal or other subject of the rod, it will be repelled towards the face, and continue to be so while the foot is kept from touching or being directly over the subject; in which case it will be sensibly and strongly attracted, and be drawn quite down. The rod should be firmly and steadily grasped; for if, when it has begun to be attracted, there be the least imaginable jerk or opposition to its attraction, it will not move any more till the hands are opened, and a fresh grasp taken. The stronger the grasp the livelier the rod moves, provided the grasp be steady and of an equal strength. This observation is very necessary; as the operation of the rod in many hands is defeated purely by a jerk or counteraction: and it is from thence concluded, that there is no real efficacy in the rod, or that the person who holds it wants the virtue: whereas, by a proper attention to this circumstance in using it, five persons in six have the virtue, as it is called; that is, the nut or fruit-bearing rod will answer in their hands. If a rod, or the least piece of one of the nut-bearing or fruit kind, be put under the arm, it will totally destroy the operation of the *virgula divinatoria*, in regard to all the subjects of it, except water, in those hands in which the rod naturally operates. If the least animal thread, as silk, or worsted, or hair, be tied round or fixed on the top of the rod, it will in like manner hinder its operation; but the same rod placed under the arm, or the same animal substances tied round or fixed on the top of the rod, will make it work in those hands, in which without these additions it is not attracted."

Such are the accounts of this extraordinary rod, to which it is probable that few will assent; and we believe the instances of mines having been discovered by it are but very rare. Another and very ancient mode of discovering mines, less uncertain than the divining rod, but extremely difficult and precarious, is that called *shodeing*; that is, tracing them by loose stones, fragments, or *shodes*, which may have been separated and carried off to a considerable distance from the vein, and are found by chance in running waters, on the superficies of the ground, or a little under. "When the tanners (says Mr Price) meet with a loose single stone of tin ore, either in a valley or in ploughing or hedging, though at 100 fathoms distance from the vein it came from, those who are accustomed to this work will not fail to find it out. They consider, that a metallic stone must originally have appertained to some vein, from which it was severed and cast at a distance by some violent means. The deluge, they suppose, moved most of the loose earthy coat of the globe, and in many places washed it off from the upper towards the lower grounds, with such a force, that most of the backs or lodes of veins which protruded themselves above the fast were hurried downwards with the common mass: whence the skill in this part of their business lies much in directing their measures according to the situation of the surface." Afterwards, however, our author complains, that this art of *shoding*, as he calls it, is in a great measure lost.

The following account of a method of finding silver mines by Alonzo Barba seems to be similar to that of *shoding* just now mentioned. "The veins of metal

(says he) are sometimes found by great stones above ground; and if the veins be covered, they hunt them out after this manner; viz. taking in their hands a sort of mattock, which has a steel point at one end to dig with, and a blunt head at the other wherewith to break stones, they go to the hollows of the mountains, where the current of rain water descends, or to some other part of the skirts of the mountains, and there observe what stones they meet with, breaking in pieces those that seem to have any metal in them; whereof they find many times both middling sort of stones and small ones also of metal. Then they consider the situation of that place, and whence these stones can tumble, which of necessity must be from higher ground, and follow the tract of them up the hill as long as they can find any of them," &c.

"Another way (says Mr Price) of discovering lodes is by working drifts across the country, as we call it, that is, from north to south, and *vice versa*. I tried the experiment in an adventure under my management, where I drove all open at grass about two feet in the shelf, very much like a level to convey water upon a mill wheel: by so doing I was sure of cutting all lodes in my way; and did accordingly discover five courses, one of which has produced above 180 tons of copper ore, but the others were never wrought upon. This method of discovering lodes is equally cheap and certain; for 100 fathoms in shallow ground may be driven at 50s. expence."

In that kind of ground called by our author *feasible*, and which he explains by the phrase *tenderstanding*, he tells us, that "a very effectual, proving, and consequential way is, by driving an adit from the lowest ground, either north or south; whereby there is a certainty to cut all lodes at 20, 30, or 40 fathoms deep, if the level admits of it. In driving adits or levels across, north or south, to unwater mines already found, there are many fresh veins discovered, which frequently prove better than those they were driving to."

After the mine is found, the next thing to be considered is, whether it may be dug to advantage. In order to determine this, we are duly to weigh the nature of the place, and its situation, as to wood, water, carriage, healthiness, and the like; and compare the result with the richness of the ore, the charge of digging, stamping, washing, and smelting.

Particularly the form and situation of the spot should be well considered. A mine must either happen, 1. In a mountain; 2. In a hill; 3. In a valley; or, 4. In a flat. But mountains and hills are dug with much greater ease and convenience, chiefly because the drains and burrows, that is, the adits or avenues, may be here readily cut, both to drain the water and to form gang-ways for bringing out the lead, &c. In all the four cases, we are to look out for the veins which the rains or other accidental thing may have laid bare; and if such a vein be found, it may often be proper to open the mine at that place, especially if the vein prove tolerably large and rich: otherwise the most commodious place for situation is to be chosen for the purpose, viz. neither on a flat, nor on the tops of mountains, but on the sides. The best situation for a mine, is a mountainous, woody, wholesome spot; of a safe easy ascent, and bordering on a navigable river.

The

Mine.

Mine. The places abounding with mines are generally healthy, as standing high, and every where exposed to the air; yet some places where mines are found prove poisonous, and can upon no account be dug, though ever so rich: the way of examining a suspected place of this kind, is to make experiments upon brutes, by exposing them to the effluvia or exhalations to find the effects.

Devonshire and Cornwall, where there are a great many mines of copper and tin, is a very mountainous country, which gives an opportunity in many places to make adits or subterraneous drains to some valley at a distance, by which to carry off the water from the mine, which otherwise would drown them out from getting the ore. These adits are sometimes carried a mile or two, and dug at a vast expence, as from 2000*l.* to 4000*l.* especially where the ground is rocky; and yet they find this cheaper than to draw up the water out of the mine quite to the top, when the water runs in plenty and the mine is deep. Sometimes, indeed, they cannot find a level near enough to which an adit may be carried from the very bottom of the mine; yet they find it worth while to make an adit at half the height to which the water is to be raised, thereby saving half the expence.

The late Mr Costar, considering that sometimes from small streams, and sometimes from little springs or collections of rain-water, one might have a good deal of water above ground, though not a sufficient quantity to turn an overshot-wheel, thought, that if a sufficient fall might be had, this collection of water might be made useful in raising the water in a mine to the adit, where it may be carried off.

But now the most general method of draining mines is by the steam-engine. See *STEAM-Engine*.

MINE, in the military art, denotes a subterraneous canal or passage, dug under the wall or rampart of a fortification, intended to be blown up by gunpowder.

The alley or passage of a mine is commonly about four feet square; at the end of this is the chamber of the mine, which is a cavity of about five feet in width and in length, and about six feet in height; and here the gunpowder is stowed. The saucisse of the mine is the train, for which there is always a little aperture left.

Two ounces of powder have been found, by experiment, capable of raising two cubic feet of earth; consequently 200 ounces, that is, 12 pound 8 ounces, will raise 200 cubic feet, which is only 16 feet short of a cubic toise, because 200 ounces joined together have proportionably a greater force than 2 ounces, as being an united force.

All the turnings a miner uses to carry on his mines, and through which he conducts the saucisse, should be well filled with earth and dung; and the masonry in proportion to the earth to be blown up, as 3 to 2. The entrance of the chamber of the mine ought to be firmly shut with thick planks, in the form of a St Andrew's cross, so that the inclosure be secure, and the void spaces shut up with dung or tempered earth. If a gallery be made below or on the side of the chamber, it must absolutely be filled up with the strongest masonry, half as long again as the height of the earth; for this gallery will not only burst, but likewise ob-

struct the effect of the mine. The powder should always be kept in sacks, which are opened when the mine is charged, and some of the powder strewed about: the greater the quantity of earth to be raised is, the greater is the effect of the mine, supposing it to have the due proportion of powder. Powder has the same effect upon masonry as upon earth, that is, it will proportionably raise either with the same velocity.

The branches which are carried into the solidity of walls do not exceed three feet in depth, and two feet six inches in width nearly: this sort of mine is most excellent to blow up the strongest walls.

The weight of a cubic foot of powder should be 80 lb. 1 foot 1 inch cube will weigh 100 lb. and 1 foot 2 inches and $\frac{1}{2}$, 150 lb. and 200 lb. of powder will be 1 foot 5 inches cube; however, there is a diversity in this, according to the quantity of saltpetre in the gunpowder.

If, when the mines are made, water be found at the bottom of the chamber, planks are laid there, on which the powder is placed either in sacks or barrels of 100 lb. each. The saucisse must have a clear passage to the powder, and be laid in an auget or wooden trough, through all the branches. When the powder is placed in the chamber, the planks are laid to cover it, and others again across these; then one is placed over the top of the chamber, which is shaped for that purpose: between that and those which cover the powder, props are placed, which shore it up; some inclining towards the outside, others to the inside of the wall; all the void spaces being filled with earth, dung, brick, and rough stones. Afterwards planks are placed at the entrance of the chamber, with one across the top, whereon they buttress three strong props, whose other ends are likewise propped against another plank situated on the side of the earth in the branch; which props being well fixed between the planks with wedges, the branch should then be filled up to its entrance with the forementioned materials. The saucisses which pass through the side branches must be exactly the same length with that in the middle, to which they join: the part which reaches beyond the entrance of the mine is that which conveys the fire to the other three; the saucisses being of equal length, will spring together.

From a great number of experiments, it appears, 1. That the force of a mine is always towards the weakest side; so that the disposition of the chamber of a mine does not at all contribute to determine this effect. 2. That the quantity of powder must be greater or less, in proportion to the greater or less weight of the bodies to be raised, and to their greater or less cohesion; so that you are to allow for each cubic fathom

Of loose earth,	-	9 or 10 lb.
Firm earth and strong sand,	-	11 or 12
Flat clayey earth,	-	15 or 16
New masonry, not strongly bound,	-	15 or 20
Old masonry, well bound,	-	25 or 30

3. That the aperture, or entonnoir of a mine, if rightly charged, is a cone, the diameter of whose base is double the height taken from the centre of the mine. 4. That when the mine has been overcharged, its entonnoir is nearly cylindrical, the diameter of the upper

Mineral. extreme not much exceeding that of the chamber.

5. That besides the shock of the powder against the bodies it takes up, it likewise crushes all the earth that borders upon it, both underneath and sidewise.

To charge a mine so as to have the most advantageous effect, the weight of the matter to be carried must be known; that is, the solidity of a right cone, whose base is double the height of the earth over the centre of the mine: thus, having found the solidity of the cone in cubic fathoms, multiply the number of fathoms by the number of pounds of powder necessary for raising the matter it contains; and if the cone contains matters of different weights, take a mean weight between them all, always having a regard to their degree of cohesion.

As to the disposition of mines, there is but one general rule, which is, that the side towards which one would determine the effect be the weakest; but this varies according to occasions and circumstances.

The calculation of mines is generally built upon this hypothesis, That the entonnoir of a mine is the frustum of an inverted cone, whose altitude is equal to the radius of the excavation of the mine, and the diameter of the whole lesser base is equal to the line of least resistance; and though these suppositions are not quite exact, yet the calculations of mines deduced from them have proved successful in practice; for which reason this calculation should be followed till a better and more simple be found out.

M. de Valliere found that the entonnoir of a mine was a paraboloid, which is a solid generated by the rotation of a semiparabola about its axis; but as the difference between these two is very insignificant in practice, that of the frustum of a cone may be used.

MINERAL, in natural history, is used in general for all fossile bodies, whether simple or compound, dug out of a mine; from whence it takes its denomination.

MINERAL Waters. All waters naturally impregnated with any heterogeneous matter which they have dissolved within the earth may be called *mineral waters*, in the most general and extensive meaning of that name; in which are therefore comprehended almost all those that flow within or upon the surface of the earth, for almost all these contain some earth or selenites. But waters containing only earth or selenites are not generally called *mineral*, but *hard* or *crude waters*.

Hard waters, which are simply selenetic, when tried by the chemical proofs, show no marks of an acid or of an alkali, nor of any volatile, sulphureous, or metallic matters. Waters which contain a disengaged calcareous earth, change the colour of syrup of violets to a green; and those that contain selenites, being mixed with a solution of mercury in nitrous acid, form a turbid mineral; and when a fixed alkali is added, they are rendered turbid, and a white sediment is precipitated. These waters also do not dissolve soap well. From these circumstances we may know, that any water which produces these effects is a hard, earthy, or selenetic water. The waters impregnated with gas are also hard.

Although the waters of the sea and saline springs be not generally enumerated amongst mineral waters, they might nevertheless be justly considered as such: for besides earthy and selenetic matters, they also contain a large quantity of mineral salts. We shall therefore consider them as such in this article.

Mineral waters, properly so called, are those in which gas, or sulphureous, saline, or metallic substances, are discovered by chemical trials. As many of these waters are employed successfully in medicine, they are also called *medicinal waters*.

Mineral waters receive their peculiar principles by passing through earths containing salts, or pyritous substances that are in a state of decomposition. Some of these waters are valuable from the quantity of useful salts which they contain, particularly of common salt, great quantities of which are obtained from these waters; and others are chiefly valued for their medicinal qualities. The former kind of mineral waters is an object of manufacture, and from them is chiefly extracted that salt only which is most valuable in commerce. See SALT.

Many of those waters have been accurately analysed by able chemists and physicians. But notwithstanding these attempts, we are far from having all the certainty and knowledge that might be desired on this important subject; for this kind of analysis is perhaps the most difficult of any in chemistry.—Almost all mineral waters contain several different substances, which being united with water may form with each other numberless compounds. Frequently some of the principles of mineral waters are in so small quantity, that they can scarcely be perceived; although they may have some influence on the virtues of the water, and also on the other principles contained in the water.—The chemical operations used in the analysis of mineral waters, may sometimes occasion essential changes in the substances that are to be discovered. And also, these waters are capable of suffering very considerable changes by motion, by rest, and by exposure to air.

Probably also the variations of the atmosphere, subterranean changes, some secret junction of a new spring of mineral or of pure water, lastly the exhaustion of the minerals whence waters receive their peculiar principles, are causes which may occasionally change the quality of mineral waters.

We need not therefore wonder that the results of analyses of the same mineral waters made by different chemists, whose skill and accuracy are not questioned, should be very different.

The consequences of what we have said on this subject are, That the examination of mineral waters is a very difficult task; that it ought not to be attempted but by profound and experienced chemists; that it requires frequent repetitions, and at different times; and lastly, that no fixed general rules can be given concerning these analyses.

As this matter cannot be thoroughly explained without entering into details connected with all the parts of chemistry, we shall here mention only the principal results, and the most essential rules, that have been indicated by the attempts hitherto made on this subject.

We may admit the division or arrangement of mineral waters into certain classes, proposed by some of the best chemists and naturalists.

Some of these waters are called *cold*, because they are not naturally hotter than the atmosphere. Some of them are even colder, especially in summer.

Those are called *hot* mineral waters, which in all seasons are hotter than the air. These are of various degrees of heat, and some of them are almost as hot

Mineral. as boiling water, In some mineral waters certain volatile, spirituous, and elastic principles may be perceived, by a very sensible piquant taste: this principle is called the *gas* or *spirit* of the waters.

The waters which contain this principle are generally lighter than pure water. They sparkle and emit bubbles, at their spring, but especially when they are shaken, and poured from one vessel into another. They sometimes break the bottles containing them, when these are well corked, as fermenting wines sometimes do. When mixed with ordinary wine, they give to it the piquancy and sparkling quality of Champaigne wine.

This volatile principle, and all the properties of the water dependent upon it, are lost merely by exposure to air, or by agitation. The waters containing this principle are distinguished by the name of *spirituous mineral waters*, or *acidulous waters*.

Other divisions of mineral waters may be made relatively to some of their predominant principles. Hence some waters are called *acidulous*, *alkaline*, *marial*, *neutral*, &c.

When a mineral water is to be examined, we may observe the following rules:

Experiments ought to be made near the spring, if possible.

The situation of the spring, the nature of the soil, and the neighbouring rising grounds, ought to be examined.

Its sensible qualities, as its smell, taste, colour, are to be observed.

Its specific gravity and heat are to be ascertained by the hydrostatical balance and the thermometer.

From the properties above-mentioned of spirituous mineral waters, we may discover whether it be one of this class. For greater certainty we may make the following trial. Let the neck of a wet bladder be tied to the neck of a bottle containing some of this water. By shaking the water, any gas that it may contain will be disengaged, and will swell the bladder. If the neck of the bladder be then tied with a string above the bottle, and be cut below this string, so as to separate the bladder from the bottle, the quantity and nature of the contained gas may be further examined.

Lastly, we must observe the changes that are spontaneously produced upon the water in close and in open vessels, and with different degrees of heat. If by these means any matter be crystallized or deposited, it must be set apart for further examination.

These preliminary experiments and observations will almost certainly indicate, more or less sensibly, something concerning the nature of the water, and will point out the method to be followed in our further inquiry.

We must then proceed to the decomposition of the water, either without addition, and merely by evaporation and distillation, or with the addition of other substances, by means of which the matters contained in the water may be precipitated and discovered. It is not material which of these two methods be first practised, but it is quite necessary that the one should succeed the other. If we begin by evaporating and distilling, these operations must be sometimes interrupted, that the several principles which rise at different times of the distillation may be obtained and examined separately, and also to allow the several salts that may be

contained to crystallize by the evaporation and by cold. Mineral.

The substances which have hitherto been met with in mineral waters are,

1. *Vitriolic acid*. This acid is sometimes found pure and unmixed with any other substance, though more frequently joined with iron or copper. In its pure state, it is most frequently found in the neighbourhood of volcanoes, where, in the opinion of Dr Donald Monro, it is most probably "distilled from mines of vitriol or of pyrites-stone, decomposed by subterraneous fire." It seems, however, more probably to proceed from the decomposition of sulphur; for neither vitriol nor pyrites will at all give a pure acid. This only can be obtained from the fumes of sulphur, which we know abound in all such places. Dr Vandelius, in a book intitled *De Thermis Agri Patavini*, published in 1761, mentions a cave near to the town of Latera, about 30 miles from Viterbo, in Italy, where a clear acid water drops from the crevices of the rocks, and is collected by the country people in glazed earthen vessels. This has a mild agreeable taste, and is found to be a pure vitriolic acid much diluted. The cavern, however, is so filled with noxious vapours, that it cannot be entered without danger of suffocation except in winter, or when it blows a north wind. A similar native vitriolic water is mentioned by Theophilus Griffonius, near the town of Salvena. Varenus also mentions a spring in the province of Nota in Sicily, the waters of which are so sour, that the neighbouring people use it instead of vinegar. In some waste coal pits, the water tastes sour, and effervesces with alkalies; but in all these the acid is mixed with much vitriol, or other matter. Dr Monro mentions acid dews collected in the East Indies: this acid he supposes to be the vitriolic, and that it probably imparts some acidity to waters upon which the dews fall.

2. *Nitrous* and *marine* acids are never found in waters pure, though the former is frequently found combined with calcareous earth, and the latter with fossil alkali, calcareous earth, or magnesia.

3. *Fixed air* enters into the composition of all waters; but abounds particularly in those of the mineral kind, at least such as are cold. It imparts an agreeable acidulous taste to such water as it is mixed with, and is found by undoubted experiments to be that which gives the power and efficacy to the cold kind. It is known to be a solvent of iron, and that by its means this metal is very often suspended in waters; and Dr Dejean of Leyden, in a letter to Dr Monro in the year 1777, supposes it to be the medium by which sulphur also is dissolved. "Having been lately at Aix La Chapelle (says he), I mixed a solution of arsenic in the marine acid with some of the water of the emperor's bath, and immediately a true and genuine sulphur was precipitated to the bottom of the vessel in which the water was contained; which convinced me that the sulphur was dissolved by means of fixed air, though Sir Torbern Bergman thinks otherwise, and that the sulphur is suspended by means of phlogiston, and the matter of heat united in the waters; and he says, that if the concentrated nitrous acid be added to these waters, it seizes the phlogiston, precipitates the sulphur, and takes away the hepatic smell." If sulphur is by this medium suspended in water,

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water, however, it must be by a natural process, with which we are entirely unacquainted; for we cannot unite sulphur and fixed air artificially. We are not informed whether there is any native mineral water impregnated only with fixed air; probably, indeed, there is not, for water thus impregnated becomes a very active solvent of calcareous and other earths, and must undoubtedly meet with something or other of this kind in passing through the ground. Many waters in Germany, particularly in the neighbourhood of the Rhine, are very much impregnated with this acid, and are esteemed otherwise pretty pure; but they have never been examined chemically to discover whether they are not impregnated also with some proportion of metallic or earthy substances.

4. *Vegetable alkali* was long supposed to be a production entirely artificial; but some late authors seem to think that it is a native salt as well as the vegetable alkali. M. Margraaf mentions his having got a true nitre, the basis of which is the vegetable alkali, from some waters at Berlin. M. Monnet says, that from the Pohoun spaw water he obtained eight grains of a grey coloured alkaline salt from a residuum of twelve Paris pints of the water, which he saturated with the vitriolic acid; and on diluting, evaporating, and crystallizing, he obtained a tartarus vitriolatus, and not a Glauber's salt as he expected. Dr Hoffman affirms, that he obtained a vitriolated tartar from the Seltzer water by mere evaporation: but as this salt has neither been found in Seltzer nor any other water by other chemists, it is probable that he has been mistaken.

5. The *fossil alkali* is found in many waters in Hungary, Tripoli, Egypt, and other countries where that salt is found native. It is combined in Seltzer water, and other acidulous waters, with fixed air, and may be obtained from them pretty pure by simple evaporation. M. Monnet informs us, that he has obtained it in tolerable purity from the waters of Auvergne: but in most of the alkaline waters this salt was in an imperfect state, and may be called rather an embryo than a perfect salt; for it would not crystallize, and made a very imperfect neutral salt with acids. It was incapable also of decomposing the selenites, which was frequently found along with it in the same water.—Bergman makes mention of an imperfect alkaline salt; but observes, that all of that kind which he had an opportunity of examining, appeared to him to be no other than a genuine mineral alkali mixed with deliquescent salts.

In some of the mineral waters near volcanoes, this kind of alkali has been found so intimately united with phlogiston as to be capable of producing a true Prussian blue, on adding a solution of silver or of green vitriol to the water; of which an example is given by Dr Nichola Andrea, in the thermal waters of a spring in the island of Ischia.

6. *Volatile alkali* has formerly been accounted an ingredient in mineral waters; but Dr Hoffman, and most of the later chemists, have denied this, as the volatile alkali is not a mineral substance. It is possible, indeed, that some waters in the neighbourhood of great quantities of putrid matter may give some tokens of volatile alkali, as was the case with Rathbone-place water, analysed by the Hon. Henry Cavendish.

7. *Glauber's salt*. Many mineral waters contain a portion of this salt, though the quantity is commonly very small. However, M. Boulduc, in the memoirs of the academy of sciences at Paris for 1724, makes mention of the waters of a spring in the neighbourhood of a village about three leagues from Madrid, which, by evaporation, yields a true Glauber's salt.—This salt, he says, is found in a concreted state about the sides of the spring, resembling the icicles which in winter hang from the roofs of houses. From this circumstance, it would seem that the water of the spring was very richly impregnated with the salt; and Dr Nichola Andrea speaks of a water at Sællia, in Calabria, which is so strongly impregnated with this kind of salt, that he thinks it would be worth while to prepare it from thence in the way of trade. It is very probable that such waters are frequently to be met with in countries where the soil is impregnated with mineral alkali.

8. *Common nitre*. In some of the barren provinces of Bengal, the earth is so strongly impregnated with this salt, that the surface is covered with a nitrous crust resembling hoar-frost; and in such places the waters are strongly impregnated with it, as may naturally be supposed. In colder countries, however, this impregnation is more rare, though instances of perfect nitre being found in springs are not wanting in Europe; but no natural combination of nitrous acid with fossil alkali, or cubic nitre, has yet been met with in any part of the world.

9. *Sea salt*. This abounds not only in the waters of the ocean, but in great numbers of salt springs; and there are but few waters so pure as not to contain some portion of it.

10. *Aerated fossil alkali*. This is found in Seltzer, and other waters of that kind, but combined with such a quantity of fixed air, that the acrid taste of the alkali is entirely covered, and the water has a brisk acidulous one. By evaporating the water, however, this superfluous quantity of air is dissipated, and the alkali then appears in its more acrid state.

11. *Gypsum, or selenites*. This composition of the vitriolic acid and lime is extremely common in mineral waters. For a long time it was supposed to be a simple earth or stone, on account of its difficult solubility in water, requiring 700 or 800 times its own weight of water to dissolve it artificially, though Dr Ruttty informs us, that the water in which it is originally dissolved will contain four or five times that proportion. There are to appearance several kinds of this substance; but whether they arise from foreign mixture, or from any difference in the calcareous earths among themselves, we know not. It is not, however, considered as a medicinal ingredient, nor indeed is the internal use of it thought to be very safe.

12. *Epsom salt*. Bergman and some other chemists have reduced all the calcareous purging salts in which the vitriolic acid is concerned; but Dr Monro observes, that these salts not only crystallize in various modes, but have different degrees of solubility in water.—Thus the Epsom salt, properly so called, dissolves in an equal quantity of water; while the calcareous nitres, or purging salts from mineral waters, require from 10 to 80 times their weight to dissolve them.—This matter would require the analysis of a great num-

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Mineral. ber of salts obtained from mineral waters in large quantity, and has not yet been thoroughly explained. These salts, however, are seldom met with by themselves in mineral waters, but usually mixed with sea-salt, iron, earth, sulphureous matter, &c. Dr Ruttty tells us, that a mineral water begins to be laxative when it contains ten grains of this salt to a pint, or 80 to a gallon.

13. *Alum.* This was formerly supposed to be a very common ingredient in mineral waters; but more accurate observations have shown it to be very rare, inasmuch that Dr Hoffman thinks it is not to be met with in any. Dr Layard, however, in the 56th volume of the Philosophical Transactions, gives an account of a chalybeate water at Somersham, from which he got five grains of alum out of two pounds of the water. Dr Ruttty supposes that the mineral water at Ballycastle, in Ireland, contains also a portion of this salt.

14. *Calcareous nitre.* This is rarely found in mineral waters, though common enough in such as are simply called *hard waters*. Dr Monro says, that the only one containing this ingredient which he ever heard of is one mentioned by Dr Home, in his treatise on bleaching.

15. 16. *Muriated calcareous earth, and muriated magnesia.* Muriated calcareous earth is likewise a rare ingredient in mineral waters, though frequently mentioned by writers on this subject. Bergman informs us, that he obtained a small quantity from a spring in Ostro-Gothland; and Dr Monro got some from the water of a salt spring at Pitkeathly, near Perth, in Scotland. It is found, as well as muriated magnesia, in sea water, though the latter is much more abundant, and probably to be met with in all salt waters whatever, but is very difficult to be obtained in a crystalline form; though its presence and nature may always be ascertained, by dropping vitriolic acid into the concentrated liquor supposed to contain it, which will both precipitate the calcareous earth, and raise the marine acid in vapours. Muriated magnesia is likewise found in salt waters, and abounds in those of the ocean. It is the principal ingredient in the bitter ley remaining after the salt is extracted from sea-water, and is much more capable of being crystallized than the former.

17. *Aerated calcareous earth, and aerated magnesia.* Both these earths may be dissolved by means of fixed air, and frequently are so in mineral waters, as well as iron. They are likewise often found in great quantity in hard waters; nor is there probably any kind of water, unless that which is distilled, entirely void of them.—When such waters are boiled, the air evaporates, and the earth falls to the bottom, which will also be the case upon long exposure to the air. Hence originates the crust upon tea-kettles, the petrifications upon different substances immersed in some kinds of water, &c. Hence also hard waters become soft, by running in channels for a considerable way; and to this cause we may with probability ascribe the growth of stones in rivulets.

18. *Vitriolated copper.* This salt is seldom found, except in waters which flow from copper mines. The water impregnated with it is emetic and purgative, and may justly be accounted poisonous rather than medicinal. On dipping clean iron into such water, the copper is instantly precipitated in its metallic state, and

the iron dissolved in its stead. Sometimes the quantity of copper is so great, that it is found advantageous to extract it in this way, as is the case in a certain stream in Ireland.

19. *Vitriolated iron* is found in considerable quantity in several waters both of England, Scotland, and Ireland, as well as in many countries on the continent. Some authors have imagined, that there is a kind of volatile vitriol with which waters are sometimes impregnated. An anonymous author, in a work intitled *delle Terme Porretane*, published at Rome in 1768, informs us, that having fixed a glass receiver to a hole through which the vapour of the water rises from the aqueduct below, he found in it a month afterwards, as well as in the mouth of the hole, a concrete and incrustated substance, like stalactite, which by experiment proved to be a true salt of iron, with a superabundant quantity of acid. Hence he concludes, that this water, as it rises from the spring, is impregnated with a fine volatile martial vitriol, in such small proportion that it cannot be discovered in any quantity that may be analysed in retorts or stills, though it may be discovered by confining for a long time the vapour, which is naturally and constantly sublimed from the whole body of the thermal water discharged from the spring, as it passes through the aqueducts. The water of this spring is strongly sulphureous, and its heat 92 degrees of Fahrenheit.

Another kind of supposed volatile vitriol is that composed of iron, dissolved by fixed air. The notion of this being a volatile substance arose from observing that there are some waters which taste strongly chalybeate at the fountain, but, after running for a little way, lose it entirely. This, however, is founded on a mistake; for it is only one of the ingredients, viz. the fixed air, which flies off when it is combined with earth; after which the iron precipitates in a similar manner.

20. *Vitriolated zinc.* This has been found native in the bowels of the earth; and thence has been supposed, not without reason, to be an ingredient in mineral waters: but none have yet brought any decisive experiments on this subject, except Dr Ruttty and Dr Gmelin, who both say that they have obtained a white vitriol from mineral waters which were at the same time impregnated with iron and some other ingredients.

21. *Muriated manganese.* Waters impregnated with this salt are mentioned both by Bergman and Scheele; but the particular properties of them are not known.

22. *Arsenic* has been supposed sometimes to be an ingredient in mineral waters, though no certain proofs of its existence have been brought. Poisonous springs, supposed to be impregnated with it, are mentioned by Varenius; and Dr Baldassari tells us of a small spring (near to the Aqua Sancta, in the country of Siena), the waters of which kill any animal that drinks them. He suspects this to be owing to arsenic, but was afraid to analyse the water.

23. *Fossil oils.* Almost all waters, even those which are accounted the most pure, contain some portion of an oily matter, though generally so small that it cannot be perceived without evaporating a large quantity of the liquid. Some contain it in great quantity; inasmuch that, besides impregnating the water as strongly as possible, a great quantity falls to the bottom,

Mineral. tom, or swims on the top. The other ingredients of these bituminous waters have not been examined; but in whatever manner the oil is united with the water, a portion of it adheres very obstinately, so that it cannot be fully separated even by filtration through paper. A fine bituminous vapour rises from the bottom of some wells, and pervades the water, taking fire on the application of any flaming substance, though no oil is observed in the water itself. Of this kind are the burning wells at Brosely and Wigan in Lancashire in England, and others in different countries.—The cause of the inflammation of these waters was first discovered in 1759 by Mr Thomas Shirley, who caused the waters of the well at Wigan to be drained away; and found that the inflammable vapour rose from the ground at the bottom, where it would take fire, as it did at the surface of the water. On applying his hand to the place whence the vapour issued, he found the impulse of it like a strong breath; or wind; and the same sensation was felt on applying his hand to the surface of the water. See *Phil. Trans.* vol. 26.

24. *Sulphur.* This is a common ingredient in mineral waters; and its presence is known by the strong hepatic smell they emit, as well as by their blackening silver, &c. Sulphureous waters are frequently very clear and transparent when taken up at the fountain; but when kept in open vessels, or bottles not well stopped, they soon deposit the sulphur they contain in the form of a dirty white powder, and lose their sulphureous smell. The bottom of the wells containing such waters, or of the channels in which they run, assume a black colour, and a raggy kind of matter is deposited on such substances as they run over for some time; and when these are taken up and dried, they appear covered with a true sulphur. Some waters contain this ingredient in very considerable quantity. From that of Harrowgate it may be separated by filtration; and Father de Tertre, in the second volume of his *Histoire Naturelle des Antilles*, tells us, that when he was in the island of Guadaloupe, and amusing himself one day with evaporating in a tin plate some sulphureous water which he found near the burning mountain, there remained on the plate a layer of sulphur about the thickness of a leaf of paper. Dr Monro mentions his having obtained a true sulphur, by evaporation, from a mineral water at Castle-Leod, in the county of Ross, in Scotland. Dr Brown, in his *Travels*, informs us, that having caused some of the pipes which carry off the water from the duke's bath at Baden, in Austria, to be opened, he took from thence a quantity of fine sulphur in powder, something like flour of brimstone, which had been sublimed from the waters. A similar kind of sulphur is obtained from the upper part of the pipes and conduits which convey the waters of Aix-la-Chapelle from their sources.

From these, and other facts of a similar nature, Dr Monro concludes, that sulphur is dissolved by some means or other in the water. Great differences, however, have taken place among chemists concerning the mode in which sulphur is thus dissolved. Sulphur, we know, may be dissolved by means of an alkali, as well as by calcareous earth; and there are some instances of alkaline waters containing sulphur, though we are not absolutely certain that the alkaline salt is the bond of

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union betwixt the sulphur and them. Dr Vandelius, in his treatise *de Thermis agri Patavini*, already quoted, mentions a substance found in the conduits of the waters of the baths at Aponum, which he calls crystallized sulphur, and says that it dissolves in the waters by boiling, recovering afterwards its solid form. This substance has not been examined; but we know of no other mineral with which sulphur readily assumes a crystalline form than terra ponderosa.—This compound is easily dissolved in water, and communicates to it a most powerful taste and smell of hepatic sulphuris. Great part of the terra ponderosa, though not the whole, may be separated by fixed air, so that it is probably this permanent compound which Vandellius observed. Dr Lucas supposed that the sulphureous waters contain both an acid and phlogiston; and Sir Torbern Bergman, that they are impregnated only with the hepatic gas; and that this gas consists of sulphur united with phlogiston, from which the sulphur may be precipitated by the nitrous acid.

For an account of the cause of heat in mineral waters, see the article SPRINGS.

Having now mentioned the principal substances that form almost all these waters, we shall next show the proofs by means of which they may be discovered in water, without decomposing the water by evaporation or by distillation.

If any portion of disengaged acid or alkali be contained in water, it may be known by the taste, by changing the colour of violets or of turnsol, and by adding the precise quantity of acid or of alkali that is necessary for the saturation of the contained disengaged saline matter.

Sulphur, and liver of sulphur, may be discovered in waters by their singular smell, and by the black colour which these substances give to white metals or to their precipitates, but especially to silver.

Vitriolic salts with earthy basis may be discovered in water by two proofs: 1. By adding some fixed alkali, which decomposes all these salts, and precipitates their earthy basis; and, 2. By adding a solution of mercury in nitrous acid, which also decomposes these salts, and forms a *turbith mineral* with their acid. But for this purpose the solution of mercury ought to have a superabundant quantity of acid: for this solution, when perfectly saturated, forms a precipitate with any kind of water, as M. Rouelle has very justly remarked: and indeed, all metallic solutions in any acids are strictly capable of decomposition by water alone, and so much more easily as the acid is more perfectly saturated with the metal.

Martial vitriol or iron combined with any acid, or even with gas, shows itself in waters by blackening an infusion of galls, or by forming a Prussian blue with the phlogisticated alkaline lixivium.

The vitriol of copper, or copper dissolved by any acid, may be discovered by adding some of the volatile spirit of sal ammoniac, which produces a fine blue colour; or by the addition of clean iron, upon the surface of which the copper is precipitated in its natural or metallic state.

Glauber's salt is discovered by adding a solution of mercury in nitrous acid, and forming with it a *turbith mineral*; or by crystallization.

Common salt contained in waters forms with a solution

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Mineral. lution of silver in nitrous acid a white precipitate, or luna cornea. It may also be known by its crystallization. Marine salt with earthy basis produces the same effect upon solution of silver. It also forms a precipitate when fixed alkali is added. The acrimony, bitterness, and deliquescency of this salt, serve to distinguish it.

The proofs related for the examination of mineral waters, are only those which are most essential. Many others may be made to confirm the former proofs: but the details of these are too extensive to be inserted here. We shall add only two of them, because they are very general, and may be very useful.

The first is the production of artificial sulphur, or of the volatile sulphureous acid; by which means the vitriolic acid may be discovered in any combination whatever. For this purpose, the matter to be examined must be mixed with any inflammable substance, and exposed to a red heat. If this matter contained but a particle of vitriolic acid, it would be rendered sensible by the sulphur, or by the volatile sulphureous acid thence produced.

The second general proof for mineral waters which we shall mention here, serves to discover any metallic substance whatever, dissolved in water by any acid. This proof consists in adding some of the liquor saturated by the colouring matter of Prussian blue. This liquor produces no effects upon any neutral salts with earthy or alkaline bases, but decomposes all metallic salts; so that if no precipitate be formed upon adding

Mineral. some of this liquor, we may be certain that the water does not contain any metallic salt; and on the contrary, if a precipitate be formed, we may certainly infer that the water does contain some metallic salt.

Two kinds only of gas, or the spirituous volatile part of some waters, are hitherto known; of which one is the volatile sulphureous acid, and the other is fixed air. See AEROLOGY, FIXED Air, and Gas, *passim*. Air united superabundantly with spirituous waters is the chief cause of their lightness, piquancy, and sparkling.

When the nature and quantities of the principles contained in a mineral water are ascertained by suitable experiments, we may imitate artificially this water, by adding to pure water the same proportions of the same substances, as Mr Venel has done in examining several waters, especially that of Selters.

We may easily perceive the necessity of using no vessels in these experiments, but such as are perfectly clean and rinsed with distilled water; of weighing the products of the experiments very exactly; of making the experiments upon as large quantities of water as is possible, especially the evaporations, crystallizations, and distillations; and of repeating all experiments several times. We may further observe, that the mixtures from which any precipitates might be expected ought to be kept two or three days, because many of these precipitates require that time, or more, to appear, or to be entirely deposited.

AN ALPHABETICAL TABLE of the most noted Mineral Waters in Europe, exhibiting their Medicinal Properties and Contents.

<i>Names of Springs.</i>	<i>Countries in which they are found.</i>	<i>Contents and quality of the water.</i>	<i>Medicinal Virtues.</i>
Abcourt,	Near St Germain's in France.	A cold chalybeate water, containing besides the iron a small quantity of fossil alkali saturated with fixed air.	Diuretic and purgative. Internally used in dropsies, jaundice, and obstructions of the viscera; externally in scorbutic eruptions, ulcers, &c.
Aberbrothick,	County of Forfar in Scotland.	A cold chalybeate. Contains iron dissolved in fixed air.	Diuretic and corroborative. Used in indigestions, nervous disorders, &c.
Acton,	Middlesex county, England.	Contains Epsom and sea salt. Cold.	Strongly purgative, and causes a soreness in the fundament.
Aghaloo,	Tyrone, Ireland.	Sulphur, fossil alkali, and some purging salt. Cold.	Alterative and corroborant. Useful in scrofulous disorders, worms, and cutaneous diseases.
Aix-la-Chapelle,	Juliers in Germany.	Sulphureous and hot. Contains aerated calcareous earth, sea-salt, fossil alkali, and sulphur.	Diaphoretic, purgative, and diuretic. Used as baths as well as taken internally. Useful in rheumatisms, and all diseases proceeding from a debility of the system.
Alford or Axford,	Somersetshire, England.	A purging salt along with sea-salt. Cold.	Strongly purgative.
Askeron,	Yorkshire, in England.	Contains Epsom salt, aerated calcareous earth, and sulphur. Cold.	Diuretic. Useful when drank in leprosy, scabs, and other cutaneous diseases.
Antrim,	Ireland,		Similar to Barrowdale water, but weaker.
Baden,	Swabia in Germany.	Hot and sulphureous springs and baths, resembling those of Aix-la-Chapelle.	See AIX-LA-CHAPELLE, and BADEN, in the order of the alphabet.

<i>Names of Springs.</i>	<i>Countries in which they are found.</i>	<i>Contents and Quality of the Water.</i>	<i>Medicinal Virtues.</i>
Bagnigge,	Middlesex, near London.	Epsom salt and muriated magnesia. Cold. Another spring contains iron and fixed air.	Strongly purgative, three half pints being a dose. The chalybeate spring also proves purgative when the bowels contain any vitiated matter.
Balimore,	Worcestershire in England.	A fine cold chalybeate, containing iron rendered soluble by fixed air, along with some other salt supposed to be fossil alkali.	Corroborative, and good in obstructions of the viscera. Drank from two to three pints in a morning.
Ball, or Baudwell,	Lincolnshire in England.	A cold petrifying water; contains aerated calcareous earth or magnesia.	Corroborative and astringent. Drunk to the quantity of two pints, or two and an half.
Balaruc,	Languedoc in France.	Hot, and contain some purging salts.	Drank as purgatives, and used as hot-baths. Useful in scrofulous and cutaneous disorders.
Ballycastle,	Antrim in Ireland.	Chalybeate and sulphureous. Cold.	Resembles that of Balmore in virtue.
Ballynahinch,	Down in Ireland.	Iron, fixed air, and sulphur. Cold.	Useful in scorbutic disorders and diseases of indigestion.
Ballyspellan,	Near Kilkenny in Ireland.	Iron, fixed air, and probably fossil alkali.	Similar in virtue to that of Balmore.
Bagniers,	Biggore in France.	Earth and sulphur. Hot.	The waters used in baths, like those of Aix-la-Chapelle. Some of the springs purgative, others diuretic.
Bareges,	Biggore in France.	Sea-salt, fossil alkali, calcareous earth, selenites, sulphur, and a fine bituminous oil. Hot.	Diuretic and diaphoretic. Useful in nervous as well as cutaneous disorders, in old wounds, and some venereal complaints. Used as baths, as well as taken internally to the quantity of a quart or three pints.
Barnet, and North-hall, Barrowdale,	Hertfordshire in England. Cumberland in England.	Epsom salt, and aerated calcareous earth. A great quantity of sea-salt, aerated calcareous earth, and some bittern. Cold.	Purgative. Strongly emetic and cathartic. Sometimes useful in the jaundice and dropsy, scorbutic disorders, and chronic obstructions. Used likewise as a bath in cutaneous diseases. Taken in the dose of a pint, containing only about seven drams and an half of sea-salt; so that a great part of the virtue must reside in the aerated calcareous earth.
Bath,	Somersetshire in England.	Iron, aerated calcareous earth, selenite, Glauber's salt, and sea-salt. Hot.	Powerfully corroborative, and very useful in all kinds of weaknesses. Used as a bath, and taken internally.
Bandola,	Italy.	Iron, fixed air, fossil alkali, and a little sulphur.—Cold.	Gently laxative, diuretic, and diaphoretic.
Brentwood,	Essex in England.	Epsom salt, and aerated calcareous earth	Purgative.
Bristol,	Somersetshire in England.	Calcareous earth, sea-salt, Epsom-salt, Glauber's salt, and selenites. Hot.	Used as a bath; and drank from four to eight ounces at a time, to two quarts per day. Useful in consumptions, diabetes, fluor albus, &c.
Bromley,	Kent in England.	Iron and fixed air. Cold.	Diuretic and corroborative.
Broughton,	Yorkshire in England.	Sulphur, sea-salt, Epsom-salt, and aerated earth. Cold.	Similar to Harroswate.
Buxton,	Derbyshire in England.	A small quantity of sea-salt, fossil alkali, Epsom-salt, and aerated calcareous earth. Hot. Here is also a fine cold chalybeate spring.	Useful in gout, rheumatism, and other disorders in which tepid baths are serviceable. Used as baths, and drank to the quantity of five or six pints per day.

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<i>Names of Springs.</i>	<i>Countries in which they are found.</i>	<i>Contents and Quality of the Water.</i>	<i>Medicinal Virtues.</i>
Caroline baths,	Bohemia.	Iron, fixed air, aerated earth, sea-salt, fossile-alkali, Epsom-salt, and Glauber's salt. Hot.	Purgative, and used as baths. Of service in disorders of the stomach and bowels, scrofula, &c.
Carlton,	Nottinghamshire in England.	Iron dissolved in fixed air, along with a bituminous oil, which gives it the smell of horse-dung.—Cold.	Diuretic and corroborative.
Carrickfergus,	Antrim in Ireland.	Seems from its bluish colour to contain a very small quantity of copper. Cold.	Weakly purgative.
Carrickmore,	Cavan in Ireland.	Fossile alkali, fixed air, and some purging salt. Cold.	Purgative and diuretic.
Cashmore,	Waterford in Ireland.	Green vitriol.	Purgative, diuretic, and sometimes emetic.
Castle-Connel,	Limerick in Ireland.	Iron dissolved in fixed air, &c. Cold.	Resembles the German Spaw, and is in considerable repute.
Castle-Leod,	Ross-shire in Scotland.	Aerated earth, felenites, Glauber's salt, and sulphur. Cold.	Diuretic, diaphoretic, and corroborant; useful in cutaneous diseases.
Castlemain,	Kerry in Ireland.	Iron, sulphur, and fixed air. Cold.	Corroborant and diuretic.
Cawley,	Derbyshire in England.	Epsom salt, aerated calcareous earth, and sulphur. Cold.	Gently purgative.
Cawthorp,	Lincolnshire in England.	Iron, fixed air, and probably fossile alkali. Cold.	Purgative, and corrects acidities.
Chadlington,	Oxfordshire in England.	Fossile alkali, sea-salt, and sulphur. Cold.	Purgative.
Chaude Fontaine,	Liege in Germany.	Aerated earth, fossile alkali, and fixed air. Hot.	Resembles those of Aix la Chapelle and Buxton.
Cheltenham,	Gloucestershire in England.	Calcareous earth, iron, Epsom salt, and common salt. Cold.	Purgative and corroborant; taken in the quantity of from one to three or four pints. Is useful in cases of indigestion and scorbutic disorders; also in the gravel.
Chippenham,	Wiltshire in England.	Iron dissolved in fixed air.	Diuretic and corroborative.
Cleves,	Germany.	Iron, fixed air, and other ingredients of Pyrmont water.	Diuretic and corroborant.
Clifton,	Oxfordshire in England.	Fossile alkali, and aerated calcareous earth or felenite. Cold.	Gently laxative, and used as a bath for cutaneous disorders.
Cobham,	Surry in England.	Iron, and some purging salt.	Purgative, diuretic, and corroborant.
Codsalwood,	Staffordshire in England.	Sulphur, fixed air, and aerated earth.	Resembles the Askeron water.
Colchester,	Essex in England.	Epsom salt, and aerated calcareous earth.	Strongly purgative.
Colurian,	Cornwall in England.	Iron, fixed air, and aerated earth.	Corroborative and diuretic.
Comner, or Cumner,	Berkshire in England.	Some purging salt, and probably aerated earth; the water is of a whitish colour.	Purgative, in the quantity of one, two, or three quarts.
Coolauran,	Fermanagh in Ireland.	Iron, fixed air, and aerated earth.	Diuretic.
Corstorphin,	Mid-Lothian in Scotland.	Sulphur, sea-salt, clay, and Epsom salt. Cold.	Diuretic and laxative.
Coventry,	Warwickshire in England.	Iron, fixed air, and some purging salt.	Purgative, diuretic, and corroborant.

<i>Names of Springs.</i>	<i>Countries in which they are found.</i>	<i>Contents and Quality of the Water.</i>	<i>Medicinal Virtues.</i>
Crickle-Spaw,	Lancashire in England.	Sulphur, sea-salt, and aerated earth.	Purgative, and resembling Harrowgate water.
Croft,	Yorkshire in England.	Aerated earth, vitriolated magnesia, and sea-salt.	Purgative, and resembling Askeron water.
Cross-town,	Waterford in Ireland.	Martial vitriol.	Diuretic, purgative, and sometimes emetic.
Cunley-house,	Lancashire in England.	Sulphur, aerated earth, and fixed air.	Purgative, and resembling the Askeron water.
Das-Wild Bad,	Nuremberg in Germany.	Iron, fixed air, and some saline matter.	Corroborant. Useful in obstructions of the viscera, and female complaints.
D'Ax en Foix,	15 leagues from Thoulouse in France.	Similar to Aix-la-Chapelle. Hot.	Used as a bath, and also drank, like the Aix-la-Chapelle waters.
Deddington,	Oxford in England.	Iron, sulphur, aerated earth, sea-salt, or fossil alkali.	Alterative, purgative in large quantity, and useful in scorbutic and cutaneous disorders.
Derby,	Near the capital of Derbyshire in England.	Iron dissolved by fixed air.	Corroborant.
Derryinch,	Fermanagh in Ireland.	Sulphur and fossil alkali.	Diuretic and diaphoretic.
Derrindaff,	Cavan in Ireland.	Sulphur and purging salt.	Similar to the Askeron water.
Derrylester,	Cavan in Ireland.	Similar to Swadlingbar water.	
Dog and Duck,	St George's-fields, London.	Aerated magnesia, Epsom salt, and sea-salt.	Cooling and purgative, but apt to bring on or increase the fluor albus in women.
Dortshall,	Staffordshire in England.	Iron dissolved in fixed air.	Corroborant.
Drig-well,	Cumberland in England.	Similar to Deddington.	
Dropping-well,	Yorkshire in England.	Aerated earth.	Astringent and corroborant.
Drumas-naue,	Leitrim in Ireland.	Sulphur, fossil alkali, with some purging salt.	Powerfully diuretic and anthelmintic, and of use in cutaneous and scrofulous disorders.
Drumgoon,	Fermanagh in Ireland.	Similar to the former.	
Dublin salt springs,	Ireland.	Sea-salt and Epsom salt.	Purgative.
Dulwich,	Kent in England.	Sea-salt and Epsom salt.	Purgative and diuretic. Useful in nervous cases and diseases proceeding from debility.
Dunnard,	18 miles from Dublin.	Iron dissolved in fixed air.	Diuretic and corroborant.
Dunse,	Scotland.	Iron dissolved in fixed air, with a little sea-salt and bittern.	Similar to the former.
Durham,	England.	Sulphur, sea-salt, and a little aerated earth. In the middle of the river is a salt spring.	Similar to the Harrowgate water. — That of the salt spring used as a purgative.
Egra,	Bohemia.	Similar to Cheltenham water.	
Epsom,	Surry in England.	Vitriolated and muriated magnesia, with a small quantity of aerated calcareous earth.	Purgative, and of use in washing old sores.
Fairburn,	Ross-shire in Scotland.	Sulphur, aerated earth, and Glauber's salt.	Alterative, and useful in cutaneous diseases.
Felstead,	Essex in England.	Similar to Kingston.	
Filah,	Yorkshire in England.	Sea-salt and aerated earth.	Powerfully diuretic and purgative.
Frankfort,	Germany.	Sulphur and sea-salt.	Similar to Harrowgate.

Gainsborough,

<i>Names of Springs.</i>	<i>Countries in which they are found.</i>	<i>Contents and Quality of the Water.</i>	<i>Medicinal Virtues.</i>
Gainsborough,	Lincolnshire in England.	Sulphur, iron, aerated earth, and Epsom salt.	Diuretic and laxative.
Galway,	Ireland.	Similar to Tunbridge water.	
Glanmire,	Ireland.	Similar to Peterhead water.	
Glastonbury,	Somersetshire in England.	Similar to Clifton water.	
Glendy,	Merns county in Scotland.	Similar to Peterhead water.	
Granshaw,	Down in Ireland.	Iron; similar to the German Spaw.	
Haigh,	Lancashire in England.	Green vitriol, iron dissolved by fixed air, with some aerated earth.	Emetic and cathartic.
Hampstead,	England.	Green vitriol, iron dissolved by fixed air, and a small quantity of aerated earth.	Alterative and corroborant. The water is taken from half a pint to several pints; is better in the morning than in the middle of the day, and in cold than hot weather.
Hanbridge,	Lancashire in England.	Similar to Scarborough water.	Less purgative than the Scarborough water.
Hanlys,	Shropshire in England.	Epsom, or other purging salt.	Purgative.
Harrowgate,	Yorkshire in England.	Sulphur, sea salt, and some purging salt. Some chalybeate springs here also.	Alterative, purgative, and anthelmintic; useful in scurvy, scrofula, and cutaneous diseases. Used externally for strains and paralytic weaknesses.
Hartfell,	Annandale in Scotland.	Green vitriol.	Astringent and corroborant. Useful in all kinds of inward discharges of blood.
Hartlepool,	Durham in England.	Sulphur, iron dissolved by fixed air, with some purging salt.	Diuretic and laxative.
Holt,	Wiltshire in England.	Purging salt, with a large quantity of aerated earth.	Mildly purgative. Useful in old ulcers and cutaneous disorders.
Joseph's well,	Stock Common near Cobham in Surry.	A very large proportion of Epsom salt, and possibly a little sea-salt.	Alterative, purgative, and diuretic. Drank to about a quart, it passes briskly without griping: taken in less doses as an alterative, it is a good antiscorbutic.
Ilmington,	Warwickshire in England.	Aerated fossile alkali, with some iron dissolved by fixed air.	Diuretic and laxative.
Inglewhite,	Lancashire in England.	Sulphur, and iron dissolved by fixed air.	Alterative. Useful in scorbutic and cutaneous diseases.
Mington,	Near London.	Iron dissolved by fixed air.	Corroborant. Useful in lowness of spirits and nervous diseases. Operates by urine, and may be drank in large quantity.
Kanturk,	Cork in Ireland.	Similar to the water at Peterhead.	
Kedlestone,	Derbyshire in England.	Sulphur, sea-salt, and aerated earth.	Similar to Harrowgate; but intolerably fetid.
Kenfington,	Near London.	Similar to Aclon water.	
Kilbrew,	Meath in Ireland.	A large quantity of green vitriol.	Emetic and cathartic, in the dose of half a pint.
Kilburn,	Near London.	Fixed air, hepatic air, Epsom salt, Glauber's salt; muriated magnesia, sea-salt, aerated earth, and iron.	
Killasher,	Fermanagh in Ireland.	Sulphur and fossile alkali.	Similar to Swadlinghar water.
Killinghanvally,	Fermanagh, Ireland.	Similar to Hanly's chalybeate water.	

<i>Names of Springs.</i>	<i>Countries in which they are found.</i>	<i>Contents and Quality of the Water.</i>	<i>Medicinal Virtues.</i>
Kilroot,	Antrim in Ireland.	Nature of Barrowdale water, but weaker.	
Kinalton,	Nottinghamshire in England.	A purging salt.	Purgative.
Kincardine,	Merns in Scotland.	Similar to the water of Peterhead.	
Kingscliff,	Northamptonshire in England.	Similar to Cheltenham waters.	
Kirby,	Westmoreland in England.	Iron, fixed air, and probably some fossile alkali.	Laxative, and useful in correcting acridities.
Knareborough Knowsley,	See <i>Dropping-well</i> . Lancashire in England.	Similar to Scarborough water.	
Kuka,	Bohemia.	Aerated fixed alkali.	Operates by insensible perspiration, sometimes by spitting, sweat, or urine.
Lancaster, Latham,	England, Lancashire in England.	Similar to Tunbridge water. Similar to the former.	
Llandrindod,	Radnor in South Wales.	Three springs; a purgative, a sulphureous, and chalybeate.	Useful in the scurvy, leprosy, cutaneous disorders, &c.
Llangybi,	Caernarvonshire in North Wales.		Useful in disorders of the eyes, scrofula, &c.
Leamington,	Warwickshire in England.	Sea-salt and aerated calcareous earth.	Emetic and cathartic. Useful in old sores, and cures mangy dogs.
Leez,	Essex in England.	Similar to Islington water.	
Lincomb,	Somersetshire in England.	Aerated iron, fossile alkali, and a little Epsom salt.	
Lisbeak,	Fermanagh in Ireland.	Sulphur, &c.	Similar to Swadlinghar water.
Lis-done-Vurna,	Clare in Ireland.	Fossile alkali, with much iron.	Emetic, cathartic, and diuretic.
Loansbury,	Yorkshire in England.	Sulphur, and some purging salt.	Used only for washing mangy dogs and scabby horses.
Maccroomp,	Cork in Ireland.	Similar to Ilmington water.	
Mahereberg,	Kerry in Ireland.	Similar to Barrowdale water.	
Mallow,	Cork in Ireland.	A hot water, similar to that of Bristol.	
Malton,	Yorkshire in England.	Iron and fixed air in considerable quantity.	Similar to Scarborough water, but is sometimes apt to vomit.
Malvern,	Gloucestershire in England.	Iron. Two springs.	Diuretic and cathartic; used also externally. Recommended as excellent in diseases of the skin; in leprosy, scorbutic complaints, scrofula, old sores, &c. Also serviceable in inflammations and other diseases of the eyes; in the gout and stone, in bilious and paralytic cases, and in female obstructions. The external use is by washing the part at the spout several times a-day, and afterwards covering it with cloths dipt in the water and kept constantly moist; also by general bathing.
Markshall, Matlock,	Essex in England. Derbyshire in England.	Similar to Islington. Warm springs, of the nature of the Bristol water, except that they are very slightly impregnated with iron, but contain a great quantity of aerated earth. They are colder than the Buxton; but their virtues similar to those of the two places mentioned.	

<i>Names of Springs.</i>	<i>Countries in which they are found.</i>	<i>Contents and Quality of the Water.</i>	<i>Medicinal Virtues.</i>
Maudsley,	Lancashire in England.	Sulphur and sea-salt.	Similar to Harrowgate.
Mechan,	Fermanagh in Ireland.	Sulphur and fossile alkali.	Similar to the waters of Drumgoon.
Miller's Spaw,	Lancashire in England.	Similar to Tunbridge.	
Moffat,	Annandale in Scotland.	Sulphur, sea-salt, and earth.	Alterant, diuretic, and sometimes purgative. Is used as a bath, and the steam of the hot water has been found servicable in relaxing hard tumors and stiff joints.
Moss-house,	Lancashire in England.	Similar to Islington water.	Purges strongly.
Moreton,	Shropshire in England.	Similar to Holt water.	
Mount D'Or,	France.	Warm, and similar to the waters of Aix-la-Chapelle.	Diuretic, purgative, and diaphoretic.
Nevil-Holt,	Leicestershire in England.	Selenite or aerated earth, and Epsom salt.	Purgative, diuretic, and diaphoretic.—Powerfully antiseptic in putrid diseases, and excellent in diarrhoea, dysenteries, &c.
New Cartmall,	Lancashire in England.	Sea-salt and aerated earth.	Purgative.
Newnham Regis,	Warwickshire in England.	Similar to Scarborough water.	
Newtondale,	Yorkshire in England.	Aerated calcareous earth or magnesia.	Astringent or tonic.
Newton-Stewart,	Tyrone in Ireland.	Similar to Tunbridge.	
Nezdenice,	Germany.	Fixed air, fossile alkali, iron, and earth.	Diuretic, diaphoretic, and tonic.
Nobber,	Meath in Ireland.	Martial vitriol.	Similar to Hartfell.
Normanby,	Yorkshire in England.	Sulphur, much fixed air, some sea-salt, and Epsom salt.	Similar to Askeron water.
Nottingham,	Dorsetshire, England.	Sulphur, fossile alkali, and earth.	Useful in cutaneous diseases.
Orston,	Nottingham, England.	Much fixed air, Epsom salt, and a little sea-salt, with some iron.	Purgative.—It intoxicates by reason of the great quantity of air contained in it.
Oulton,	Norfolk, England.	Similar to Islington.	
Owen Breun,	Cavan, Ireland.	Sulphur, Epsom salt, and fossile alkali.	Similar to Askeron water.
Paneras,	Near London.	Epsom salt, and aerated earth.	Diuretic and purgative.
Passy,	Near Paris.	Similar to Pyrmont water.	
Peterhead,	Aberdeen county, Scotland.	A strong chalybeate but of which no analysis has been published.	Similar to Islington, but more powerful.
Pettigoe,	Donnegal, Ireland.	Sulphur and purging salt.	Similar to Askeron water.
Pitkeathly,	Perthshire, Scotland.	Sea-salt, a small quantity of muriated and likewise of aerated earth.	Gently-purgative. Very useful in scrofulous and scorbutic habits.
Plombiers,	Lorraine, France.	Saline matter, probably fossile alkali, with a small portion of oil.—Warm.	Used as a bath, and for washing ulcers. Inwardly taken it cures complaints from acidity, hemorrhagies, &c.
Pontgibault,	Auvergne, France.	Fossile alkali and calcareous earth.	Diuretic and laxative
Pougues,	Nivernois, France.	Calcareous earth, magnesia, fossile alkali, sea-salt, earth of alum, and filiceous earth.	Diuretic and laxative.

<i>Names of Springs.</i>	<i>Countries in which they are found.</i>	<i>Contents and Quality of the Water.</i>	<i>Medical Virtues.</i>
Pyrmont,	Westphalia, Germany.	Aerated iron, calcareous earth, magnesia, Epsom salt, and common salt.	Diuretic, diaphoretic, and laxative. Recommended in cases where the constitution is relaxed; in female complaints, in cutaneous diseases, in nervous disorders, in the gravel and urinary obstructions; and considered as among the best restoratives in decayed and broken constitutions.
Queen Camel,	Somersetshire, England.	Sulphur, sea-salt, fossil alkali, calcareous earth, and bituminous oil.	Used in scrofulous and cutaneous disorders.
Richmond,	Surry in England.	Similar to Acton water.	
Rippon,	Yorkshire, England.	Sulphur; sea-salt, and aerated earth.	Diaphoretic and alterant.
Road,	Wiltshire, England.	Sulphur, iron, fossil alkali, and fixed air.	Useful in scrofula, scurvy, and cutaneous disorders.—Acts as a laxative.
St Bartholomew's well,	Cork in Ireland.	Fossil alkali, iron, and fixed air.	Similar to Tilbury water.
St Bernard's well,	Near Edinburgh.	Sulphureous volatile acid and phlogiston.	Somewhat congenial with Moffat and Harrowgate. In nervous and stomachic cases, analeptic and restorative; in scorbutic, scrofulous, and most dropical cases, reckoned a specific.
St Erasmus's well,	Staffordshire, England.		Similar to Barrowdale water.
Scarborough,	Yorkshire, England.	Aerated calcareous earth, Epsom salt, sea-salt, and iron.	Diuretic and purgative.
Scollensis,	Switzerland.	Iron, fossil alkali, and a great quantity of fixed air.	Excellent in colic pains, both as a cure and preventative.
Sedlitz,	Bohemia.	Epsom salt.	Strongly purgative.
Seltzer,	Germany.	Calcareous earth, magnesia, fossil alkali, and fixed air.	Diuretic. Useful in the gravel, rheumatism, scurvy, scrophula, &c.
Sene, or Send,	Wiltshire, England.	Similar to Islington.	
Seydschutz,	Germany.	Similar to Seidlitz.	
Shadwell,	Near London.	Green vitriol.	Emetic and cathartic.
Shapmoor,	Westmoreland, England.	Sulphur and purging salt.	Similar to Askeron water.
Shettlewood,	Derbyshire, England.		Similar to Harrowgate water.
Shipton,	Yorkshire, England.	Sulphur, sea-salt, and purging salt.	Similar to Harrowgate.
Somersham,	Huntingdonshire, England.	Green vitriol, alum, and fixed air.	Corroborant and alterative. Useful for washing foul ulcers and cancers.
Spaw,	Liege in Germany.	Fossil alkali, iron, aerated earth, Epsom salt, and sea-salt.	Diuretic and purgative. Serviceable in many disorders. See the article SPAW.
Stanger,	Cumberland, England.	Green vitriol.	Emetic and cathartic.
Stenfield,	Lincolnshire, England.	Similar to Orston.	
Streatham,	Surry, England.	Aerated earth, Epsom salt, sea-salt, and muriated magnesia.	Purgative.
Suchaloza,	Hungary.		Similar to Nezdence.
Sutton bog,	Oxfordshire, England.	Sulphur, fossil alkali, and sea-salt.	Alterative and laxative.
Swadlingbar,	Cavan in Ireland	Sulphur, earth, sea-salt, and fossil alkali.	Alterative and diaphoretic.
Swansey,	Glamorganshire in North Wales.	Green vitriol.	Similar to Shadwell.
Sydenham, N ^o 222.	Kent in England.	Similar to Epsom, but weaker.	

Minehead.	Names of Springs.	Countries in which they are found.	Contents and Quality of the Water.	Medical Virtues.	Minehead.
	Tarleton,	Lancashire in England.	Similar to Scarborough water.		
	Tewksbury,	Gloucestershire in England.	Similar to Acton.		
	Thetford,	Norfolk in England.	Fossile alkali, fixed air, and iron.	Purgative and diuretic.	
	Thoroton,	Nottinghamshire in England.	Similar to Orston.		
	Thursk,	Yorkshire in England.	Similar to Scarborough.		
	Tibshelf,	Derbyshire in England.	Iron dissolved in fixed air.	Similar to Spaw water.	
	Tilbury,	Essex in England.	Fossile alkali.	Diuretic and diaphoretic.	
	Tober Bony,	Near Dublin in Ireland.	Fossile alkali, earth, and bituminous oil.	Similar to Tilbury.	
	Tonstein,	Cologne in Germany.	Fossile alkali.	Similar to Seltzer, but more purgative.	
	Tralee,	Kerry in Ireland.	Similar to Castle Connel.		
	Tunbridge,	Kent in England.	Iron, some sea-salt, with a little selenites and calcareous earth.	An excellent chalybeate, useful in all diseases for which the Spaw is recommended.	
	Upminster,	Essex in England.	Sulphur, fossile alkali, and purging salt.	Purgative and diuretic.	
	Vahls,	Dauphiny in France.	Fossil alkali.	Diuretic and laxative.	
	Wardrew,	Northumberland.	Sulphur, earth, and sea-salt.	Similar to Harrowgate water.	
	Weatherstack,	Westmoreland in England.	Iron, sea-salt, and a small quantity of hepatic gas.	Purgative.	
	Wallenfrow,	Northamptonshire in England.	Similar to Islington water.		
	West Ashton,	Wiltshire in England.	Similar to Islington.		
	Westwood,	Derbyshire in England.	Green vitriol.	Similar to Shadwell. Used for washing ulcers of the legs.	
	Wexford,	Ireland.	Similar to Islington.		
	Whiteacre,	Lancashire in England.	Aerated iron and probably calcareous earth.	Somewhat astringent.	
	Wigglesworth,	Yorkshire in England.	Sulphur, earth, and common salt.	Emetic in the quantity of two quarts, and said to be cathartic in the quantity of three; a singular circumstance if true.	
	Wildungan,	Waldech in Germany.	Similar to the waters of Bath.	Useful in scorbutic and gouty diseases.	
	Witham,	Essex in England.	Aerated iron, and common salt.	Diuretic, alterative, and corroborant.	
	Wirksworth,	Derbyshire in England.	Sulphur, purging salt, and aerated iron.	Useful in scrofulous and cutaneous diseases.	
	Zahorovice,	Germany.	Similar to Nezdence water.	Much esteemed in scrofulous cases.	

MINEHEAD, a town of Somersetshire, 166 miles from London. It is an ancient borough, with a harbour in the Bristol channel, near Dunster castle, much frequented by passengers to and from Ireland. It was incorporated by Queen Elisabeth, with great privileges, on condition the corporation should keep the quay in repair; but its trade falling off, the quay was neglected, and they lost their privileges. A statute was obtained in the reign of King William, for recovering the port, and keeping it in repair, by which they were to have the profits of the quay and pier for 36 years, which have been computed at about 200 l. a year; and they were at the expence of new-building the quay. In pursuance of another act, confirming the former, a new head has been built to the quay, the beach cleared, &c. so that the biggest ship may enter, and ride safe in the harbour. The town contains about 500 houses, and 2000 souls. It was for-

merly governed by a portreve, and now by two constables chosen yearly at a court-leet held by the lord of the manor. Its chief trade is with Ireland, from whence about 40 vessels used to come hither in a year with wool; and about 4000 chaldrons of coals are yearly imported at this place. Watchet and Poriock, from South Wales, which lies directly opposite to it, about seven leagues over, the common breadth of this channel all the way from Holmes to the Land's End. Here are several rich merchants, who have some trade also to Virginia and the West Indies; and they correspond much with the merchants of Barnestaple and Bristol in their foreign commerce. Three or four thousand barrels of herrings, which come up the Severn in great shoals about Michaelmas, are caught, cured, and shipped off here every year, for the Mediterranean, &c. The market here is on Wednesday, and fair on Whitsun-Wednesday.

M I N E R A L O G Y,

IS that science which teaches us the properties of mineral bodies, and by which we learn how to characterise, distinguish, and class them into a proper order.

INTRODUCTION.

MINERALOGY seems to have been in a manner coeval with the world. Precious stones of various kinds appear to have been well known among the Jews and Egyptians in the time of Moses; and even the most rude and barbarous nations appear to have had some knowledge of the ores of different metals. As the science is nearly allied to chemistry, it is probable that the improvements both in chemistry and mineralogy have nearly kept pace with each other; and indeed it is but of late, since the principles of chemistry were well understood, that mineralogy has been advanced to any degree of perfection. The best way of studying mineralogy, therefore, is by applying chemistry to it; and not contenting ourselves merely with inspecting the outsides of bodies, but decomposing them according to the rules of chemistry. This method has been brought to the greatest perfection by Mr Pott of Berlin, and after him by Mr Cronstedt of Sweden. To obtain this end, chemical experiments in the large way are without doubt necessary: but as a great deal of the mineral kingdom has already been examined in this manner, we do not need to repeat

all those experiments in their whole extent, unless some new and particular phenomena should discover themselves in those things we are examining; else the tediousness of those processes might discourage some from going farther, and take up much of the time of others that might be better employed. An easier way may therefore be adopted, which even for the most part is sufficient, and which, though made in miniature, is as scientific as the common manner of proceeding in the laboratories, since it imitates that, and is founded upon the same principles. This consists in making the experiments upon a piece of charcoal with the concentrated flame of a candle directed through a blow-pipe. The heat occasioned by this is very intense; and the mineral bodies may here be burnt, calcined, melted, and scorified, &c. as well as in any great works.

For a description of the blow-pipe, the method of using it, the proper fluxes to be employed, and the different subjects of examination to which that instrument is adapted, see the article *Blow-Pipe*, where all those particulars are concisely detailed. It may not be improper here, however, to resume those details at greater length; avoiding, at the same time, all unnecessary repetitions. After which we shall exhibit a scientific arrangement of the mineral kingdom, according to the most approved system.

PART. I. EXPERIMENTAL MINERALOGY; with a DESCRIPTION of the NECESSARY APPARATUS (A).

SECT. I. Of Experiments upon Earths and Stones.

WHEN any of these substances are to be tried, we must not begin immediately with the blow-pipe; but some preliminary experiments ought to go before, by which those in the fire may afterwards be directed. For instance, a stone is not always homogeneous, or of the same kind throughout, although it may appear to the eye to be so. A magnifying glass is therefore necessary to discover the heterogeneous particles, if there be any; and these ought to be separated, and every part tried by itself, that the effects of two different things, examined together, may not be attributed to one alone. This might happen with some of the finer micæ, which are now and then found mixed with small particles of quartz, scarcely to be perceived by the eye. The trapp (in German *schwarzstein*) is also sometimes mixed with very fine particles of felspar (*spatum scintillans*) or of calcareous spar, &c. After this experiment, the hardness of the stone in question must be tried with steel. The flint and garnets are commonly known to strike fire with steel; but there are also other stones, which, though very seldom, are

found so hard as likewise to strike fire. There is a kind of trapp of that hardness, in which no particles of felspar are to be seen. Coloured glasses resemble true gems; but as they are very soft in proportion to these, they are easily discovered by means of the file. The common quartz-crystals are harder than coloured glasses, but softer than the gems. The loadstone discovers the presence of iron, when it is not mixed in too small a quantity in the stone, and often before the stone is roasted. Some kinds of hæmatites, and particularly the cœrulescens, greatly resemble some other iron ores; but this distinguishes itself from them by a red colour when pounded, the others giving a blackish powder, and so forth.

The management of the *Blow-pipe* has been described under that article; but a few particulars may be here recapitulated, or added.

The candle ought to be snuffed often, but so that the top of the wick may retain some fat in it, because the flame is not hot enough when the wick is almost burnt to ashes; but only the top must be snuffed off, because a low wick gives too small a flame. The blue flame is the hottest; this ought, therefore, to be forced

(A) From Engeström's *Treatise on the Blow-Pipe*, and Magellan's *Description of Pocket-Laboratories*, &c. subjoined to the English Translation of *Cronstedt's Mineralogy*, 2d edit. in 2 vols. Dilly.

On
Earths and
Stones

forced out when a great heat is required, and only the point of the flame must be directed upon the subject which is to be essayed. M. Magellan recommends, as being most cleanly and convenient, that the candle be made of wax, and the wick should be thicker than ordinary. Its upper end must be bended towards the matter intended to be heated, and the stream of air must be directed along the surface of the bended part, so as not absolutely to touch it.

The piece of charcoal made use of in these experiments must not be of a disposition to crack. If this should happen, it must gradually be heated until it does not crack any more, before any assay is made upon it. If this be not attended to, but the assay made immediately with a strong flame, small pieces of it will split off in the face and eyes of the assayer, and often throw along with them the matter that was to be assayed. Charcoal which is too much burnt consumes too quick during the experiment, leaving small holes in it, wherein the matter to be tried may be lost; and charcoal that is burnt too little, catches flame from the candle, burning by itself like a piece of wood, which likewise hinders the process.

Of those things that are to be assayed, only a small piece must be broken off for that purpose, not bigger than that the flame of the candle may be able to act upon it at once, if required; which is sometimes necessary, as, when the matter requires to be made red hot throughout, the piece ought to be broken as thin as possible, at least the edges; the advantage of which is obvious, the fire having then more influence upon the subject, and the experiment being more quickly made.

Some of the mineral bodies are very difficult to be kept steady upon the charcoal during the experiment, before they are made red hot; because, as soon as the flame begins to act upon them, they split asunder with violence, and are dispersed. Such often are those which are of a soft consistence or a particular figure, and which preserve the same figure in however minute particles they are broken; for instance, the calcareous spar, the sparry gypsum, sparry fluor, white sparry lead-ore, the potters ore, the tessellated mock-lead or blende, &c. even all the common fluors which have no determinate figure. These not being so compact as common hard stones, when the flame is immediately urged upon them, the heat forces itself through and into their clefts or pores, and causes this violent expansion and dispersion. Many of the clays are likewise apt to crack in the fire, which may be for the most part ascribed to the humidity, of which they always retain a portion.

The only way of preventing this inconvenience is to heat the body as slowly as possible. It is best, first of all, to heat that place of the charcoal where the piece is intended to be put on; and afterwards lay it thereon: a little crackling will then ensue, but commonly of no great consequence. After that, the flame is to be blown very slowly towards it, in the beginning not directly upon, but somewhat above it, and so approaching nearer and nearer with the flame until it become red hot. This will do for the most part; but there are nevertheless some, which, notwithstanding all these precautions, it is almost impossible to keep on the charcoal. Thus the fluors are generally

the most difficult; and as one of their principal characters is discovered by their effects in the fire *per se*, they ought necessarily to be tried that way. To this purpose, it is best to make a little hole in the charcoal to put the fluor in, and then to put another piece of charcoal as a covering upon this, leaving only a small opening for the flame to enter. As this stone will nevertheless split and fly about, a larger piece thereof than is before-mentioned must be taken, in order to have at least something of it left.

But if the experiment is to be made upon a stone whose effects one does not want to see in the fire *per se*, but rather with fluxes, then a piece of it ought to be forced down into melted borax, when always some part of it will remain in the borax, notwithstanding the greatest part may sometimes fly away by cracking.

1. *Of substances to be tried in the fire per se.* As the stones undergo great alterations when exposed to the fire by themselves, whereby some of their characteristics, and often the most principal, are discovered, they ought first to be tried that way, observing what has been said before concerning the quantity of matter, direction of the fire, &c. The following are generally the results of this experiment.

Calcareous earth or stone, when it is pure, does not melt by itself, but becomes white and friable, so as to break freely between the fingers; and, if suffered to cool, and then mixed with water, it becomes hot, just like common quick-lime. As in these experiments only very small pieces are used, this last effect is best discovered by putting the proof on the outside of the hand, with a drop of water to it, when instantly a very quick heat is felt on the skin. When the calcareous substance is mixed with the vitriolic acid, as in gypsum, or with a clay, as in marle, it commonly melts by itself, yet more or less difficultly in proportion to the differences of the mixtures. Gypsum produces generally a white, and marle a grey, glass or slag. When there is any iron in it, as a white iron ore, it becomes dark, and sometimes quite black, &c.

The *siliceæ* never melt alone, but become generally more brittle after being burnt. Such of them as are coloured become colourless, and the sooner when it does not arise from any contained metal; for instance, the topazes, amethysts, &c. some of the precious stones, however, excepted: And such as are mixed with a quantity of iron grow dark in the fire, as some of the jaspers, &c.

Garnets melt always into a black slag, and sometimes so easily that they may be brought into a round globe upon the charcoal.

The *argillaceæ*, when pure, never melt, but become white and hard. The same effects follow when they are mixed with phlogiston. Thus the soap-rock is easily cut with the knife; but being burnt it cuts glass, and would strike fire with the steel, if as large a piece as is necessary for that purpose could be tried in this way. The soap-rocks are sometimes found of a dark brown and nearly black colour, but nevertheless become quite white in the fire like a piece of China ware. However, care must be taken not to urge the flame from the top of the wick, there being for the most part a sooty smoke, which commonly will darken all that it touches; and, if this is not observed, a mistake in the experiment might easily happen. But if

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it is mixed with iron, as it is sometimes found, it does not so easily part with its dark colour. The argillaceæ when mixed with lime melt by themselves, as above-mentioned. When mixed with iron, as in the boles, they grow dark or black; and if the iron is not in too great a quantity, they melt alone into a dark slag; the same happens when they are mixed with iron and a little of the vitriolic acid, as in the common clay, &c.

Mica and *asbestos* become somewhat hard and brittle in the fire, and are more or less refractory, though they give some marks of fusibility.

The *fluors* discover one of their chief characteristics by giving a light like phosphorus in the dark, when they are slowly heated; but lose this property, as well as their colour, as soon as they are made red hot.—They commonly melt in the fire into a white opaque slag, though some of them not very easily.

Some sorts of the *zeolites* melt easily, and foam in the fire, sometimes nearly as much as borax, and become a frothy slag, &c.

A great many of those mineral bodies which are impregnated with iron, as the *boles*, and some of the white iron ores, &c. as well as some of the other iron ores, viz. the bloodstone, are not attracted by the loadstone before they have been thoroughly roasted, &c.

2. Of *substances heated with fluxes*. After the mineral bodies have been tried in the fire by themselves, they ought to be heated with fluxes to discover if they can be melted or not, and some other phenomena attending this operation. For this purpose, three different kinds of salts are used as fluxes, viz. *sal sodæ*, borax, and *sal fusibile microscicum*; (see the article *Blow-Pipe*).

The *sal sodæ* is, however, not much used in these small experiments, its effects upon the charcoal rendering it for the most part unfit for it; because, as soon as the flame begins to act upon it, it melts instantly, and is almost wholly absorbed by the charcoal. When this salt is employed to make any experiment, a very little quantity is wanted at once, viz. about the cubical contents of an eighth part of an inch, more or less. This is laid upon the charcoal, and the flame blown on it with the blow-pipe; but as this salt commonly is in form of a powder, it is necessary to go on very gently, that the force of the flame may not disperse the minute particles of the salt. As soon as it begins to melt, it runs along on the charcoal, almost like melted tallow; and when cold, it is a glassy matter of an opaque dull colour spread on the coal. The moment it is melted, the matter which is to be tried ought to be put into it, because otherwise the greatest part of the salt will be soaked into the charcoal, and too little of it left for the intended purpose. The flame ought then to be directed on the matter itself; and if the salt spreads too much about, leaving the proof almost alone, it may be brought to it again by blowing the flame on its extremities, and directing it towards the subject of the experiment. In the assays made with this salt, it is true, we may find whether the mineral bodies which are melted with it have been dissolved by it or not: but we cannot tell with any certitude whether this is done hastily and with force, or gently and slow; nor whe-

ther a less or a greater part of the matter has been dissolved: neither can it be well distinguished if the matter has imparted any weak tincture to the slag; because this salt always bubbles upon the charcoal during the experiment, nor is it clear when cool; so that scarcely any colour, except it be a very deep one, can be discovered, although it may sometimes be coloured by the matter that has been tried.

The following earths are entirely *soluble* in this flux with effervescence: Agate; chalcedony; carnelian; Turkey stone †, (*cos Turcica*); fluor mineralis †; onyx; opal; quartz; common flint; ponderous spar. The following are *divisible* in it with or without effervescence, but not entirely soluble: Amianthus; asbestos; basalt; chrysolite †; granate †; hornblende; jasper; marlstone; mica; the mineral of alum from Tolfa; petrosilex; aluminous slate and roof slate from Helsingia; emeralds; steatites; common flint; schoerl; talc; trapp; tripoli; tourmalin. And the following are neither fusible nor divisible in it: Diamond; hyacinth; ruby; sapphire; topaz.

The other two salts, viz. borax and the *sal microscicum*, are very well adapted to these experiments, because they may by the flame be brought to a clear uncoloured and transparent glass; and as they have no attraction to the charcoal, they keep themselves always upon it in a round globular form. The *sal fusibile microscicum* is very scarce, and perhaps not to be met with in the shops; it is made of urine. § See Chemistry, n° 905, 906.

The following earths are soluble in borax, with more or less effervescence: Fluor mineralis †; marle; mica †; the mineral of alum from Tolfa; aluminous slate, and roof-slate from Helsingia †; ponderous spar; schoerl; talc †; tourmalin. And the following *without* effervescence: Agate; diamond; amianthus; asbestos; basalt; chalcedony; carnelian; chrysolite; *cos turcica*; granate; hyacinth *; jasper; lapis ponderosus; onyx; opal; petrosilex; quartz *; ruby; sapphire; common flint *; steatite; trapp; trippel, or tripoli; topaz; zeolite; hydrophanes.

In the microcosmic salt, the following are soluble with more or less effervescence: Basalt †; turkey stone †; fluor mineralis †; marle; mica; the mineral of alum from Tolfa; schistus aluminaris, schistus tegularis from Helsingia †; schoerl; spathum ponderosum; tourmalin †; lapis ponderosus. And the following *without* visible effervescence: Agate; diamond; amianthus; asbestos; chalcedony; carnelian; chrysolite; granate; hyacinth; jasper; onyx ‖; opal; petrosilex; quartz ‖; ruby; sapphire; common flint ‖; emerald; talc; topaz; trapp; trippel; zeolite; hornblend; hydrophanes; lithomarga; steatites.

Calcareous earth, ponderous spar, gypsum, and other additaments, often assist the solution, as well in the microcosmic salt as in borax. To which it is necessary to add, that in order to observe the effervescence properly, the matter added to the flux should be in the form of a small particle rather than in fine powder; because in this last there is always air between the particles, which being afterwards driven off by the heat afford the appearance of a kind of effervescence (A).

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(A) In the above lists, the articles marked † effervesce very little; those marked ‡ not at all; those marked * require a larger quantity of the flux and a longer continuance of heat than the rest; those marked ‖ are more difficultly dissolved than the others.

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The quantity of those two salts required for an experiment is almost the same as the *sal soda*; but as the former are crystallised, and consequently include a great deal of water, particularly the borax, their bulk is considerably reduced when melted, and therefore a little more of them may be taken than the before-mentioned quantity.

Both those salts, especially the borax, when exposed to the flame of the blow-pipe, bubble very much and foam before they melt to a clear glass, which for the most part depends on the water they contain. And as this would hinder the assayer from making due observations on the phenomena of the experiment, the salt which is to be used must first be brought to a clear glass before it can serve as a flux; it must therefore be kept in the fire until it become so transparent that the cracks in the charcoal may be seen through it. This done, whatsoever is to be tried is put to it, and the fire continued.

Here it is to be observed, that for the assays made with any of these two fluxes on mineral bodies, no larger pieces must be taken than that altogether they may keep a globular form upon the charcoal; because it may then be better distinguished in what manner the flux acts upon the matter during the experiment. If this be not observed, the flux, communicating itself with every point of the surface of the mineral body, spreads all over it, and keeps the form of this last, which commonly is flat, and by that means hinders the operator observing all the phenomena which may happen. Besides, the flux being in too small a quantity in proportion to the body to be tried, will be too weak to act with all its force upon it. The best proportion therefore is about a third part of the mineral body to the flux; and as the quantity of the flux above mentioned makes a globe of a due size in regard to the greatest heat that is possible to procure in these experiments, so the size of the mineral body must be a third part less here than when it is to be tried in the fire by itself.

The *sal soda*, as has been already observed, is not of much use in these experiments; nor has it any particular qualities in preference to the two last mentioned salts, except that it dissolves the zeolites easier than they do.

The microcosmic salt shows almost the same effects in the fire as the borax, only differing from it in a very few circumstances; of which one of the principal is, that, when melted with manganese, it becomes of a crimson hue instead of a jacinth colour, which borax takes. This salt is, however, for its scarcity still very little in use, borax alone being that which is commonly employed. Whenever a mineral body is melted with any of these two last mentioned salts, in the manner already described, it is easily seen, Whether it quickly dissolves; in which case an effervescence arises, that lasts till the whole be dissolved: Whether the solution be slowly performed; in which case few and small bubbles only rise from the matter: or, Whether it can be dissolved at all; because, if not, it is observed only to turn round in the flux, without the least bubble, and the edges look as sharp as they were before.

In order farther to illustrate what has been said about these experiments, we shall give a few examples of the effects of borax upon the mineral bodies.—The calca-

reous substances, and all those stones which contain any thing of lime in their composition, dissolve readily and with effervescence in the borax. The effervescence is the more violent the greater the portion of lime contained in the stone. This cause, however, is not the only one in the gypsum, because both the constituents of this do readily mix with the borax, and therefore a greater effervescence arises in melting gypsum with the borax than lime alone.—The *siliceæ* do not dissolve; some few excepted which contain a quantity of iron.—The *argillaceæ*, when pure, are not acted upon by the borax: but when they are mixed with some heterogeneous bodies, they are dissolved, though very slowly; such are, for instance, the stone-marrow, the common clay, &c.

The *granates*, *zeolites*, and *trapp*, dissolve but slowly. The *fluors*, *asbestinæ*, and *micaceæ*, dissolve for the most part very easily; and so forth.—Some of these bodies melt to a colourless transparent glass with the borax; for instance, the calcareous substances when pure, the fluors, some of the zeolites, &c. Others tinge the borax with a green transparent colour, viz. the granates, trapp, some of the argillaceæ, and some of the micaceæ and asbestinæ. This green has its origin partly from a small portion of iron which the granates particularly contain, and partly from phlogiston.

Borax can only dissolve a certain quantity of the mineral body proportional to its own. Of the calcareous kind it dissolves a vast quantity; but turns at last, when too much has been added, from a clear transparent to a white opaque slag. When the quantity of the calcareous matter exceeds but little in proportion, the glass looks very clear as long as it remains hot: but as soon as it begins to cool, a white half opaque cloud is seen to arise from the bottom, which spreads over the third, half, or more of the glass globe, in proportion to the quantity of calcareous matter; but the glass or slag is nevertheless shining, and of a glassy texture when broken. If more of this matter be added, the cloud rises quicker and is more opaque, and so by degrees till the slag becomes quite milk white. It is then no more of a shining, but rather dry appearance, on the surface; is very brittle, and of a grained texture when broken.

SECT. II. Of Experiments upon Metals and Ores.

WHAT has been hitherto said relates only to the stones and earths: We shall now proceed to describe the manner of examining metals and ores. An exact knowledge and nicety of procedure are so much the more necessary here, as the metals are often so disguised in their ores, as to be very difficultly known by their external appearance, and liable sometimes to be mistaken one for the other: Some of the cobalt ores, for instance, resemble much the *pyrites arsenicalis*; there are also some iron and lead ores, which are nearly like one another, &c.

As the ores generally consist of metals mineralised with sulphur or arsenic, or sometimes both together, they ought first to be exposed to the fire by themselves, in order not only to determine with which of these they are mineralised, but also to set them free from those volatile mineralising bodies: This serves instead of calcination, by which they are prepared for further assays.

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Here it must be repeated, that whenever any metal or fusible ore is to be tried, a little concavity must be made in that place of the charcoal where the matter is to be put; because, as soon as it is melted, it forms itself into a globular figure, and might then roll from the charcoal, if its surface was plain; but when borax is put to it, this inconvenience is not so much to be feared.

Whenever an ore is to be tried, a small bit being broke off for the purpose, it is laid upon the charcoal, and the flame blown on it slowly. Then the sulphur or arsenic begins to part from it in form of smoke: these are easily distinguished from one another by their smell; that of sulphur being sufficiently known, and the arsenic smelling like garlick. The flame ought to be blown very gently as long as any smoke is seen to part from the ore; but after that, the heat must be augmented by degrees, in order to make the calcination as perfect as possible. If the heat be applied very strongly from the beginning upon an ore that contains much sulphur or arsenic, the ore will presently melt, and yet lose very little of its mineralising bodies, by that means rendering the calcination very imperfect. It is, however, impossible to calcine the ores in this manner to the utmost perfection, which is easily seen in the following instance, viz. in melting down a calcined potter's ore with borax, it will be found to bubble upon the coal, which depends on the sulphur which is still left, the vitriolic acid of this uniting with the borax, and causing this motion. However, lead in its metallic form, melted in this manner, bubbles upon the charcoal, if any sulphur remains in it. But as the lead, as well as some of the other metals, may raise bubbles upon the charcoal, although they are quite free from the sulphur, only by the flames being forced too violently on it, these phenomena ought not to be confounded with each other.

The ores being thus calcined, the metals contained in them may be discovered, either by being melted alone or with fluxes; when they show themselves either in their pure metallic state, or by tinging the slag with a colour peculiar to each of them. In these experiments it is not to be expected that the quantity of metal contained in the ore should be exactly determined; this must be done in larger laboratories. This cannot, however, be looked upon as any defect, since it is sufficient for a mineralogist only to find out what sort of metal is contained in the ore. There is another circumstance, which is a more real defect in the miniature laboratories, which is, that some ores are not at all capable of being tried by so small an apparatus; for instance, the gold ore called *pyrites aureus*, which consists of gold, iron, and sulphur. The greatest quantity of gold which this ore contains is about one ounce, or one ounce and an half, out of 100 pounds of the ore, the rest being iron and sulphur: and as only a very small bit is allowed for these experiments, the gold contained therein can hardly be discerned by the eye, even if it could be extracted; but it goes along with the iron in the slag, this last metal being in so large a quantity in proportion to the other, and both of them having an attraction for each other.

The blendes and black-jacks, which are mineral zinc ores, containing zinc, sulphur, and iron, cannot be tried this way, because they cannot be perfectly

calcined, and besides the zinc flies off when the iron scorifies. Neither can those blendes, which contain silver or gold mineralised with them, be tried in this manner, which is particularly owing to the imperfect calcination. Nor are the quicksilver ores fit for these experiments; the volatility of that semimetal making it impossible to bring it out of the poorer sort of ores; and the rich ores, which sweat out the quicksilver when kept close in the hand, not wanting any of these assays, &c. Those ores ought to be assayed in larger quantities, and even with such other methods as cannot be applied upon a piece of charcoal.

Some of the rich silver ores are easily tried: for instance, *minera argenti vitrea*, commonly called *silver-glass*, which consists only of silver and sulphur. When this ore is exposed to the flame, it melts instantly, and the sulphur goes away in fume, leaving the silver pure upon the charcoal in a globular form. If this silver should happen to be of a dirty appearance, which often is the case, then it must be melted anew with a very little borax; and after it has been kept in fusion for a minute or two, so as to be perfectly melted and red-hot, the proof is suffered to cool: it may then be taken off the coal, and being laid upon the steel-plate†, the silver is separated from the slag by one or two strokes of the hammer†. Here the use of the article †See the
blafs ring† is manifest; for this ought first to be placed upon the plate, to hinder the proof from flying off by the violence of the stroke, which otherwise would happen. The silver is then found inclosed in the slag of a globular form, and quite shining, as if it was polished. When a large quantity of silver is contained in a lead ore, viz. in a potter's ore, it can likewise be discovered through the use of the blow-pipe, of which more will be mentioned hereafter.

Tin may be melted out of the pure tin ores in its metallic state. Some of these ores melt very easily, and yield their metal in quantity, if only exposed to the fire by themselves: but others are more refractory; and as these melt very slowly, the tin, which sweats out in form of very small globules, is instantly burnt to ashes before these globules have time to unite in order to compose a larger globe, which, might be seen by the eye, and not so soon destroyed by the fire; it is therefore necessary to add a little borax to these from the beginning, and then to blow the flame violently at the proof. The borax does here preserve the metal from being too soon calcined, and even contributes to the readier collecting of the small metallic particles, which soon are seen to form themselves into a globule of metallic tin at the bottom of the whole mass, nearest to the charcoal. As soon as so much of the metallic tin is produced as is sufficient to convince the operator of its presence, the fire ought to be discontinued, though the whole of the ore be not yet melted; because the whole of this kind of ore can be seldom or never reduced into metal by means of these experiments, a great proportion being always calcined: and if the fire is continued too long, perhaps even the metal already reduced may likewise be burnt to ashes; for the tin is very soon deprived of its metallic state by the fire.

Most part of the lead ores may be reduced to a metallic state upon the charcoal. The *minera plumbi calciformes*, which are pure, are easily melted into lead; but

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but such of them as are mixed with an *ochra ferri*, or any kind of earth, as clay, lime, &c. yield very little of lead, and even nothing at all, if the heterogenea are combined in any large quantity: this happens even with the *minera plumbi calciformis arsenico mixta*. These therefore are not to be tried but in larger laboratories. However, every mineral body suspected to contain any metallic substance may be tried by the blow-pipe, so as to give sufficient proofs whether it contain any or not, by its effects being different from those of the stones or earths, &c.

The *minera plumbi mineralisate* leave the lead in a metallic form, if not too large a quantity of iron is mixed with it. For example, when a tessellated or steel-grained lead ore is exposed to the flame, its sulphur, and even the arsenic if there be any, begins to fume, and the ore itself immediately to melt into a globular form; the rest of the sulphur continues then to fly off, if the flame be blown slowly upon the mass; but, on the contrary, very little of the sulphur will go off, if the flame be forced violently on it: in this case, it rather happens that the lead itself crackles and dissipates, throwing about very minute metallic particles. The sulphur being driven out as much as possible, which is known by finding no sulphureous vapour in smelling at the proof, the whole is suffered to cool, and then a globule of metallic lead will be left upon the coal. If any iron is contained in the lead-ore, the lead, which is melted out of it, is not of a metallic shining, but rather of a black and uneven surface: a little borax must in this case be melted with it, and as soon as no bubble is seen to rise any longer from the metal into the borax, the fire must be discontinued: when the mass is grown cold, the iron will be found scorified with the borax, and the lead left pure and of a shining colour.

Borax does not scorify the lead in these small experiments when it is pure: if the flame is forced with a violence on it, a bubbling will ensue, resembling that which is observed when borax dissolves a body melted with it; but when the fire ceases, the slag will be perfectly clear and transparent, and a quantity of very minute particles of lead will be seen spread about the borax, which have been torn off from the mass during the bubbling.

If such a lead ore is rich in silver, this last metal may likewise be discovered by this experiment; because as the lead is volatile, it may be forced off, and the silver remain. To effect this, the lead, which is melted out of the ore, must be kept in constant fusion with a slow heat, that it may be consumed. This end will be sooner obtained, and the lead part quicker, if during the fusion the wind through the blow-pipe be directed immediately, though not forcibly, upon the melted mass itself, until it begin to cool; at which time the fire must be directed on it again. The lead, which is already in a volatilising state, will by this artifice be driven out in form of a subtil smoke; and by thus continuing by turns to melt the mass, and then to blow off the lead, as has been said, until no smoke is any longer perceived, the silver will at last be obtained pure. The same observation holds good here also, which was made about the gold, that, as none but very little bits of ores can be employed in these experiments, it will be difficult to extract the silver

out of a poor ore; for some part of it will fly off with the lead, and what might be left is too small to be discerned by the eye. The silver, which by this means is obtained, is easily distinguished from lead by the following external marks, viz. that it must be red-hot before it can be melted: it cools sooner than lead: it has a silver colour; that is to say, brighter and whiter than lead: and is harder under the hammer.

The *minera cupri calciformes* (at least some of them), when not mixed with too much stone or earth, are easily reduced to copper with any flux; if the copper is found not to have its natural bright colour, it must be melted with a little borax, which purifies it. Some of these ores do not all discover their metal if not immediately melted with borax; the heterogenea contained in them hindering the fusion before these are scorified by the flux.

The grey copper ores, which only consist of copper and sulphur, are tried almost in the same manner as above mentioned. Being exposed to the flame by themselves, they will be found instantly to melt, and part of their sulphur to go off. The copper may afterwards be obtained in two ways: the one, by keeping the proof in fusion for about a minute, and afterwards suffering it to cool; when it will be found to have a dark and uneven appearance externally, but which after being broken discovers the metallic copper of a globular form in its centre, surrounded with a regulus, which still contains some sulphur and a portion of the metal: the other, by being melted with borax, which last way sometimes makes the metal appear sooner.

The *minera cupri pyritacea*, containing copper, sulphur, and iron, may be tried with the blow-pipe if they are not too poor. In these experiments the ore ought to be calcined, and after that the iron scorified. For this purpose a bit of the ore must be exposed to a slow flame, that as much of the sulphur as possible may part from it before it is melted, because the ore commonly melts very soon, and then the sulphur is more difficultly driven off. After being melted, it must be kept in fusion with a strong fire for about a minute, that a great part of the iron may be calcined; and after that, some borax must be added, which scorifies the iron, and turns with it to a black slag. If the ore is very rich, metallic copper will be had in the slag after the scorification. If the ore be of a moderate richness, the copper will still retain a little sulphur, and sometimes iron: the product will therefore be brittle, and must with great caution be separated from the slag, that it may not break into pieces; and if this product is afterwards treated in the same manner as before said, in speaking of the grey copper-ores, the metal will soon be produced. But if the ore is poor, the product after the first scorification must be brought into fusion, and afterwards melted with some fresh borax, in order to calcine and scorify the remaining portion of iron; after which it may be treated as mentioned in the preceding paragraph. The copper will in this last case be found in a very small globule.

The copper is not very easily scorified with this apparatus, when it is melted together with borax, unless it has first been exposed to the fire by itself for a while in order to be calcined. When only a little of this metal is dissolved, it instantly tinges the slag of a red-
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dish brown colour, and mostly opaque; but as soon as this slag is kept in fusion for a little while, it becomes quite green and transparent: and thus the presence of the copper may be discovered by the colour, when it is concealed in heterogeneous bodies, so as not to be discovered by any other experiment.

If metallic copper is melted with borax by a slow fire, and only for a very little time, the glass or slag becomes of a fine transparent blue or violet colour, inclining more or less to the green: but this colour is not properly owing to the copper, but it may rather be to its phlogiston; because the same colour is to be had in the same manner from iron; and these glasses, which are coloured with either of those two metals, soon lose their colour if exposed to a strong fire, in which they become quite clear and colourless. Besides, if this glass, tinged blue with the copper, is again melted with more of this metal, it becomes of a good green colour, which for a long time keeps unchanged in the fire.

The iron ores, when pure, can never be melted *per se*, by the means of the blow-pipe alone; nor do they yield their metal when melted with fluxes; because they require too strong a heat to be brought into fusion; and as both the ore and the metal itself very soon lose their phlogiston in the fire, and cannot be supplied with a sufficient quantity from the charcoal, so likewise they are very soon calcined in the fire. This easy calcination is also the reason why the fluxes, for instance borax, readily scorify this ore, and even the metal itself. The iron loses its phlogiston in the fire sooner than the copper, and is therefore more easily scorified.

The iron is, however, discovered without much difficulty, although it were mixed but in a very small quantity with heterogeneous bodies. The ore, or those bodies which contain any large quantity of the metal, are all attracted by the loadstone, some without any previous calcination, and others without having being roasted. When a clay is mixed with a little iron, it commonly melts by itself in the fire; but if this metal is contained in a limestone, it does not promote the fusion, but gives the stone a dark and sometimes a deep black colour, which always is the character of iron. *A minera ferri calciformis pura crystallifata*, is commonly of a red colour: This being exposed to the flame, becomes quite black; and is then readily attracted by the loadstone, which it was not before. Besides these signs, the iron discovers itself, by tinging the slag of a green transparent colour, inclining to brown, when only a little of the metal is scorified; but as soon as any larger quantity thereof is dissolved in the slag, this becomes first a blackish brown, and afterwards quite black and opaque.

Bismuth is known by its communicating a yellowish brown colour to borax; and arsenic by its volatility and garlick smell. Antimony, both in form of regulus and ore, is wholly volatile in the fire when it is not mixed with any other metal except arsenic; and is known by its particular smell, easier to be distinguished when once known than described. When the ore of antimony is melted upon the charcoal, it bubbles constantly during its volatilizing.

Zinc ores are not easily tried upon the coal; but
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the regulus of zinc exposed to the fire upon the charcoal burns with a beautiful blue flame, and forms itself almost instantly into white flowers, which are the common flowers of zinc.

Cobalt is particularly remarkable for giving to the glass a blue colour, which is the zaffre or smalt. To produce this, a piece of cobalt ore must be calcined in the fire, and afterwards melted with borax. As soon as the glass, during the fusion, from being clear, seems to grow opaque, it is a sign that it is already tinged a little; the fire is then to be discontinued, and the operator must take hold, with the nippers, of a little of the glass, whilst yet hot, and draw it out slowly in the beginning, but afterwards very quick, before it cools, whereby a thread of the coloured glass is procured, more or less thick, wherein the colour may easier be seen than in a globular form. This thread melts easily, if only put in the flame of the candle without the help of the blow-pipe.—If this glass be melted again with more of the cobalt, and kept in fusion for a while, the colour becomes very deep; and thus the colour may be altered at pleasure.

When the cobalt ore is pure, or at least contains but little iron, a cobalt regulus is almost instantly produced in the borax during the fusion; but when it is mixed with a quantity of iron, this last metal ought first to be separated, which is easily performed since it scorifies sooner than the cobalt; therefore, as long as the slag retains any brown or black colour, it must be separated, and melted again with fresh borax, until it shows the blue colour.

Nickel is very seldom to be had; and as its ores are seldom free from mixtures of other metals, it is very difficultly tried with the blow-pipe. However, when this semimetal is mixed with iron and cobalt, it is easily freed from these heterogeneous metals, and reduced to a pure nickel regulus by means of scorification with borax, because both the iron and cobalt sooner scorify than the nickel. The regulus of nickel itself is of a green colour when calcined: it requires a pretty strong fire before it melts, and tinges the borax with a hyacinth colour. Manganese gives the same colour to borax; but its other qualities are quite different, so as not to be confounded with the nickel.

By means of the foregoing explanations, and those given under the article *Blow-Pipe*, any gentleman, who is a lover of this science, will be able, in an easy manner, to amuse himself in discovering the properties of those works of nature, with which the mineral kingdom furnishes us; or more usefully to employ himself by finding out what sorts of stones, earths, ores, &c. there are on his estate, and to what economical purposes they may be employed. The scientific mineralist may, by examining into the properties and effects of the mineral bodies, discover the natural relation these bodies stand in to each other, and thereby furnish himself with materials for establishing a mineral system, founded on such principles as Nature herself has laid down in them; and this in his own study, without being forced to have recourse to great laboratories, crucibles, furnaces. &c. which is attended with much trouble, and is the reason why so few can have an opportunity of gratifying their desire of knowledge in
this

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this part of natural history. Farther improvements of this apparatus may still be made by those who choose to bestow their attention upon it.

A great number of fluxes might, perhaps, be found out, whose effects might be different from those already in use, whereby more distinct characters of those mineral bodies might be discovered, which now either show ambiguous ones, or which it is almost impossible to try exactly with the blow-pipe. Instead of the *sal soda*, some other salt might be discovered better adapted to these experiments. But it is very necessary not to make use of any other fluxes on the charcoal than such as have no attraction to it: if they, at the same time, be clear and transparent, when melted, as the borax and the *sal fusibile microcosmicum*, it is still better: however, the transparency and opacity are of no great consequence, if a substance be essayed only in order to discover its fusibility, without any attention to its colour; in which case, some metallic slag, perhaps, might be useful.

When such ores are to be reduced whose metals are very easily calcined, as tin, zinc, &c. it might perhaps be of service to add some phlogistic body, such as hard resin, since the charcoal cannot afford enough of it in the open fire of these essays. The manner of melting the volatile metals out of their ores *per descensum* might also, perhaps, be imitated: for instance, a hole might be made in the charcoal, wide above and very narrow at the bottom; a little piece of the ore being then laid at the upper end of the hole, and covered with some very small pieces of the charcoal, the flame must be directed on the top: the metal might, perhaps, by this method, run into the hole below, concealed from the violence of the fire, particularly if the ore is very fusible, &c.

The use of the apparatus above referred to, and which may be called a *pocket laboratory* (as the whole admits of being easily packed into a small case), is chiefly calculated for a travelling mineralist. But a person who always resides at one and the same place, may by some alteration make it more commodious to himself, and avoid the trouble of blowing with the mouth. For this purpose he may have the blow-pipe go through a hole in a table, and fixed underneath to a small pair of bellows with double bottoms, such as some of the glass-blowers use, and then nothing more is required than to move the bellows with the feet during the experiment; but in this case a lamp may be used instead of a candle. This method would be attended with a still greater advantage, if there were many such parts as *c*, fig. 13. the openings of which were of different dimensions: those parts might by means of a screw be fastened to the main body of the blow-pipe, and taken away at pleasure. The advantage of having these nozzles of different capacities at their ends, would be that of exciting a stronger or weaker heat as occasion might require. It would only be necessary to observe, that in proportion as the opening or nozzle of the pipe is enlarged, the quantity of the flame must be augmented by a thicker wick in the lamp, and the force of blowing increased by means of weights laid on the bellows; a much intenser heat would thus be produced by a pipe of a considerable opening at the end, by which the expe-

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riments must undoubtedly be carried farther than the common blow-pipe.

A traveller, who has seldom an opportunity of carrying many things along with him, may very well be contented with this laboratory and its apparatus, which are sufficient for most part of such experiments as can be made on a journey. There are, however, other things very useful to have at hand on a journey, which ought to make a separate part of a portable laboratory, if the manner of travelling does not oppose it: this consists of a little box including the different acids, and one or two matrasles, in order to try the mineral bodies in liquid menstrua if required.

These acids are, the acid of nitre, of vitriol, and of common salt. Most of the stones and earths are attacked, at least in some degree, by the acids; but the calcareous are the easiest of all to be dissolved by them, which is accounted for by their calcareous properties. The acid of nitre is that which is most used in these experiments; it dissolves the limestone, when pure, perfectly, with a violent effervescence, and the solution becomes clear: when the limestone enters into some other body, it is nevertheless discovered by this acid, through a greater or less effervescence in proportion to the quantity of the calcareous particles, unless there are so few as to be almost concealed from the acid by the heterogeneous ones. In this manner a calcareous body, which sometimes nearly resembles a siliceous or argillaceous one, may be known from these latter, without the help of the blow-pipe, only by pouring one or two drops of this acid upon the subject; which is very convenient when there is no opportunity nor time of using this instrument.

The gypsa, which consist of lime and the vitriolic acid, are not in the least attacked by the acid of nitre, if they contain a sufficient quantity of their own acid; because the vitriolic acid has a stronger attraction to the lime than the acid of nitre: but if the calcareous substance is not perfectly saturated with the acid of vitriol, then an effervescence arises with the acid of nitre, more or less in proportion to the want of the vitriolic acid. These circumstances are often very essential in distinguishing the *calcareae* and *gypsa* from one another.

The acid of nitre is likewise necessary in trying the zeolites, of which some species have the singular effect to dissolve with effervescence in the above mentioned acid; and within a quarter of an hour, or even sometimes not until several hours after, to change the whole solution into a clear jelly, of so firm a consistence, that the glass wherein it is contained may be reversed without its falling out.

If any mineral body is tried in this menstruum, and only a small quantity is suspected to be dissolved, though it was impossible to distinguish it with the eye during the solution, it can be easily discovered by adding to it *ad saturitatem* a clear solution of the alkali, when the dissolved part will be precipitated, and fall to the bottom. For this purpose the *sal soda* may be very useful.

The acid of nitre will suffice for making experiments upon stones and earths; but if the experiments are to be extended to the metals, the other two acids are also necessary.

Another instrument is likewise necessary to a complete

I

complete

Plate
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Portable Apparatus. complete Pocket-Laboratory, viz. a washing-trough (fig. 21.), in which the mineral bodies, and particularly the ores, may be separated from each other, and from the adherent rock, by means of water. This trough is very common in laboratories, and is used of different sizes; but here only one is required of a moderate size, such as 12 inches and a half long, three inches broad at the one end and one inch and a half at the other end, sloping down from the sides and the broad end to the bottom, where it is three quarters of an inch deep. It may, however, be made of much smaller dimensions. It is commonly made of wood, which ought to be chosen smooth, hard, and compact, wherein are no pores in which the minute grains of the pounded matter may conceal themselves. It is to be observed, that if any such matter is to be washed as is suspected to contain some native metal, such as silver or gold, a trough should be procured for this purpose of a very shallow slope; because the minute particles of the native metal have then more power to assemble together at the broad end, and separate from the other matter.

The management of this trough, or the manner of washing, consists in this: That when the matter is mixed with about three or four times its quantity of water in the trough, this is kept very loose between two fingers of the left hand, and some light strokes given on its broad end with the right, that it may move backwards and forwards; by which means the heaviest particles assemble at the broad and lower end, from which the lighter ones are to be separated by inclining the trough and pouring a little water on them. By repeating this process, all such particles as are of the same gravity may be collected together, and separated from those of different gravity, provided they were before equally pounded: though such as are of a clayey nature, are often very difficult to separate from the rest, which, however, is of no great consequence to a skilful and experienced washer. The washing process is very necessary, as there are often rich ores, and even native metals, found concealed in earths and sand in such minute particles as not to be discovered by any other means.

SECT. III. Description of an Improved Portable Laboratory for assaying Minerals.

THE chief pieces and implements of the portable laboratories are represented in Plate XCIX. at *Blow-Pipe*, and in Plate CCCXIII. annexed to the present article.

I. The first contains those belonging to the *Dry Laboratory*, so called on account of its containing whatever is required to try all kinds of fossils in the dry way by fire, without any of the humid menstruums. They are made to pack in a box of the size of an octavo book, lined with green velvet, and covered with black fish-skin; the inside divided into different compartments, suited to the size, form, and number of the implements it is to contain. Of these the principal are described under *Blow-Pipe*. We must here, however, add the following remarks and alterations of that instrument by Mr Magellan.

Plate CCCXIII. D and Q (fig. 13.) are the two pieces that form the blow-pipe, which is here represented entire. This very useful instrument has been considerably improved

of late in England. The mouth-piece *aa* is made of ivory, to avoid the disagreeable sensation of having a piece of metal a long time between the teeth and lips, which, if not of silver or gold, may be very noxious to the operator; a circumstance that has been hardly noticed before.

1. If the mouth-piece *aa* be made of a round form, it cannot be held for any length of time between the teeth and lips, to blow through it, without straining the muscles of the mouth, which produces a painful sensation. It must, therefore, have such an external figure, as to adapt itself accurately to the lateral angles of the lips, having a flattish oval form externally, with two opposite corners to fit those internal angles of the mouth, when it is held between the lips, as may be seen in that represented in the figure.

2. The small globe *bb* is hollow, for receiving the moisture of the breath; and must be composed of two hemispheres, exactly screwing into one another in *bb*; the male-screw is to be in the lower part, and soldered on the crooked part *Q* of the tube *QD*, at such a distance, that the inside end of the crooked tube be even with the edge of the hemisphere, as represented by the pointed lines in the figure. But the upper hemisphere is to be soldered at the end of the straight tube *D*. By these means, the moisture arising from the breath falls into the hollow of the lower hemisphere, where it is collected round the upper inside end of the crooked part *Q* of the blow-pipe, without being apt to fall into it.

3. The small nozzles, or hollow conical tubes, advised by Messrs Engestrom, Bergman, and others, are wrong in the principle; because the wind that passes from the mouth through such long cones loses its velocity by the lateral friction, as happens in hydraulic spouts; which, when formed in this manner, do never throw the fluid so far as when the fluid passes through a hole of the same diameter, made in a thin plate of a little metallic cap that screws at the end of the large pipe. It is on this account that the little cap *c* is employed, having a small hole in the thin plate, which serves as a cover to it; and there are several of these little caps, with holes of smaller and larger sizes, to be changed and applied whenever a flame is required to be more or less strong.

4. Another convenience of these little caps is, that even in case any moisture should escape falling into the hemisphere *bb*, and pass along with the wind through the crooked pipe *Q*, it never can arrive at nor obstruct the little hole of the cap *c*, there being room enough under the hole in the inside, where this moisture must be stopped till it is cleaned and wiped out.

The stream of air that is impelled by the blow-pipe (as seen in fig. 3.) upon the flame, must be constant and even, and must last as long as the experiment continues to require it. This labour will fatigue the lungs, unless an equable and uninterrupted inspiration can at the same time be continued. To succeed in this operation without inconvenience, some labour and practice are necessary, as already explained under the detached article.

Every assay ought always to begin by the exterior flame, which must be first directed upon the mass under examination; and, when its efficacy is well known, then the interior blue flame is to be employed.

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Apparatus.Portable
Apparatus.

After the ore is roasted, it is to be rounded up on the steel plate by the hammer; the particles being prevented from being dissipated by the ring H (fig. 9. Plate XCIX.), within which the pieces to be broken are to be put.

Among the apparatus, beside the particulars already mentioned, three phials are necessary, containing the required fluxes, viz. the *borax*, the *sal soda*, and *sal fusibile microcosmicum*. Other useful particulars are, A small link of hard steel, to try the hardness or softness of mineral substances, and also to strike fire for lighting the candle when required: A piece of black flint, to serve as a touch-stone; (for being rubbed with any metal, if it be gold the marks will not be corroded by aqua fortis); and also to strike fire, when necessary, with the link of steel: An artificial load-stone, properly armed with iron, for the better preservation of its attractive power; (it serves to discover the ferrugineous particles of any ore after it has been roasted and powdered:.) A triple magnifier, which, differently combined, produces seven magnifying powers, the better to distinguish the structure and metallic parts of ores, and the minute particles of native gold, whenever they contain that metal: A file, to try the hardness of stones and crystals, &c.: Some pieces of dry agaric or tinder, and small bits or splinters of wood tipped with brimstone, to serve as matches for lighting the candle; and various other little articles of use in these experiments.

II. For performing experiments in the *Humid Way*, the chief additional articles (and which must be kept in a separate case) consist of a collection of phials, containing the principal acids, tests, precipitants, and re-agents, both for examining mineral bodies by the humid way, and for analysing the various kinds of mineral waters. Those with acids and corrosive solutions have not only ground stopples, but also an external cap to each, ground over the stopple, and secured downward by a bit of wax between both, in order to confine the corrosive and volatile fluids within. But those which contain mild fluid liquors have not such external caps; and those with dry inoffensive substances are only stopped with cork. Besides these phials, there are two smaller cylindrical ones, which serve to exhibit the changes of colour produced by some of the re-agents in those analytical assays. There are also two or three small matrasces, to hold the substances with their solvents over the fire; a small glass funnel for pouring the fluids; a small porcelain mortar, with its pestle; one or two crucibles of the same substance; a small wooden trough to wash the ground ores; some glass sticks to stir up the fluid mixtures; and, finally, pieces of paper tinged red, yellow, and blue, by the tinctures of Fernambuc wood (commonly called Brasil wood), turmeric, and litmus, thickened with a little starch.

The following list contains the names of the various fluid tests and re-agents that are necessary for these assays. But the whole number being too large to be all contained in a portable case, every one may give the preference to those he likes best.

1. Concentrated vitriolic acid, whose specific gravity may be expressed in the outside.
2. Nitrous acid, purified by the nitrous solution of silver.

3. Concentrated marine acid, with its specific gravity.
4. Marine acid dephlogisticated.
5. Aqua regia for gold, viz. 2 nit. and 1 marine.
6. Aqua regia for platina, viz. half marine and half nitrous acid.
7. Nitrous solution of silver.
8. Nitrous solution of mercury, made in the cold.
9. Muriatic solution of barytes.
10. Nitrous solution of lime.
11. Muriatic solution of lime.
12. Mercury in its metallic state.
13. Corrosive sublimate of mercury.
14. White arsenic.
15. Nitrous solution of silver.
16. Nitrous solution of copper.
17. Acid of sugar.
18. Liquor probatorius vini.
19. Hepar sulphuris.
20. Oil of tartar *per deliquium*.
21. Salt of tartar.
22. Caustic vegetable alkali.
23. Pearl-ashes.
24. Soap-makers ley.
25. Common salt.
26. Vitriolated argilla (alum.)
27. Vitriol of iron (copperas.)
28. Nitrous solution of silver.
29. Acetous solution of lead.
30. Acetous solution of barytes.
31. Phlogisticated alkali by the Prussian blue.
32. Lime-water.
33. Lime-water phlogisticated by the Prussian blue.
34. Caustic volatil alkali.
35. Mild volatile alkali (dry)
36. Rectified spirit (alcohol)
37. Æther.
38. Spirituous tincture of galls.

The following tests are very fit also for these assays, viz. 39. Spirituous solutions of soap; 40. Syrup of violets; 41. Tincture of litmus; 42. Tincture of Brasil wood; 43. Tincture of turmeric; 44. Oil of olives; 45. Oil of linseed; 46. Oil of turpentine; 47. Essential salt of wild-forrel; 48. Hepar sulphuris; 49. Sugar of lead; 50. Solution of alum.

The method of applying the above tests, of acids and re-agents may be seen in Bergman's treatises of the Analysis of Waters, and of Assaying by the Humid Way; in Kirwan's Elements of Mineralogy; in the Elements of Chemistry of Dijon; in the Memoirs of the same Academy; in Fourcroy's Lectures of Chemistry, &c.

III. The *Lamp-furnace* Laboratory, for experiments both by the *humid* and the *dry* way, is a very curious and useful, though small apparatus. It is an improvement of that which was contrived by M. de Morveau, in consequence of the information he received from his friend the president de Virly, who saw at Upsal how advantageously the late eminent professor Bergman availed himself of this convenience for many analytical processes in miniature, by the use of very small glass vessels about one inch diameter, and other implements of proportional size, for performing various chemical operations. (See the Dijon Memoirs for 1783, Part 1. p. 171.)

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Apparatus.

There can be no doubt but that whenever these processes are properly conducted, though in miniature, the lamp-furnace will prove amply sufficient to perform in a few minutes, and with very little expence, the various solutions, digestions, and distillations, which otherwise would require large vessels, stills, retorts, reverberatory furnaces, &c. to ascertain the component parts of natural bodies; though it is not always sufficient to ascertain their respective quantities. In this last case, operations must be performed in great laboratories, and on a large scale, at a considerable expence. But the substances are sometimes too valuable; as, for instance, when precious stones are examined; and of course the last way never can be attempted in such cases.

These small processes have likewise another advantage before noticed, which cannot be obtained in works at large. It consists in one's being able to observe the gradual progress of each operation; of easily retarding or urging it, as it may require; and of ascertaining at pleasure each step of every experiment, together with the phenomena attending the same.

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The lamp-furnace is mounted in a small parallelogram of mahogany, about six inches long and four wide, marked fig. 5. This is kept steady over the edge of a common table, by means of the metallic clamp *ww*, which is fastened by the screw *x*. The pillar *rs* is screwed in a vertical position on the plate *s*, being about ten inches high; the other is screwed to the opposite corner, marked *pk*, and is only $7\frac{1}{2}$ inches long; both are composed of two halves, that screw at *tt*, to be easily packed up with all the implements in a case covered with black fish-skin, and lined with green velvet, like the other laboratory already described.

The lamp *k*, fig. 3. is supported on the plate *f*, which has a ring *l* that runs in the column *pk*, and may be fixed by its screw *l* at the required height.— This lamp has three small pipes of different sizes, to receive as many wicks of different thickness, and to be filled with spirit of wine. By a similar method, a piece of charcoal is mounted and supported by the pliers or little forceps screwed to the arm *ac*, fig. 1. which has all the motions requisite for being fixed by means of proper screws, at a proper distance from the flame of the wick *b*. The blow-pipe, fig. 4. is, by a similar mechanism, mounted on the smaller column *pq*, at such a distance as to blow the flame *hi* to the piece of ore *m*, which is upon the charcoal *gf*.

Every thing being disposed in this manner, the operator blows through the mouth-piece of the blow-pipe, fig. 4. and remains with his hands free to make the changes and alterations he may think proper.—

[*N.B.* The large round cavity *e* in the middle of the parallelogram, fig. 5. is to receive the lamp *k*, fig. 3. when all the implements are packed up in their case of black fish-skin; and the cover of the lamp is represented by fig. 12.]

But if the operator has the double bellows, fig. 14. and 15. he fixes them, at a due distance, to the same table by the brass clamp *y*. He then unscrews the blow-pipe at *zz*: joins the mouth *m* of the flexible tube to the hemisphere *zz*, passing each orifice, thro' the leather tube fig. 11. and tying both ends with a waxed thin pack-thread. If he works with his foot

on the pedal, the string of which is seen hanging from the end of the bellows, fig. 15. (and is always up, on account of the weight *e*), then the air is absorbed by the bellows fig. 15. from whence it is propelled by the motion of the foot on the pedal to the bellows, fig. 14. whose constant weight *r* drives it out through the flexible pipe, fig. 10. it of course enters the curved part *zzi* of the blow-pipe, and drives the flame on the piece *m* of the ore, that is to be examined upon the charcoal.

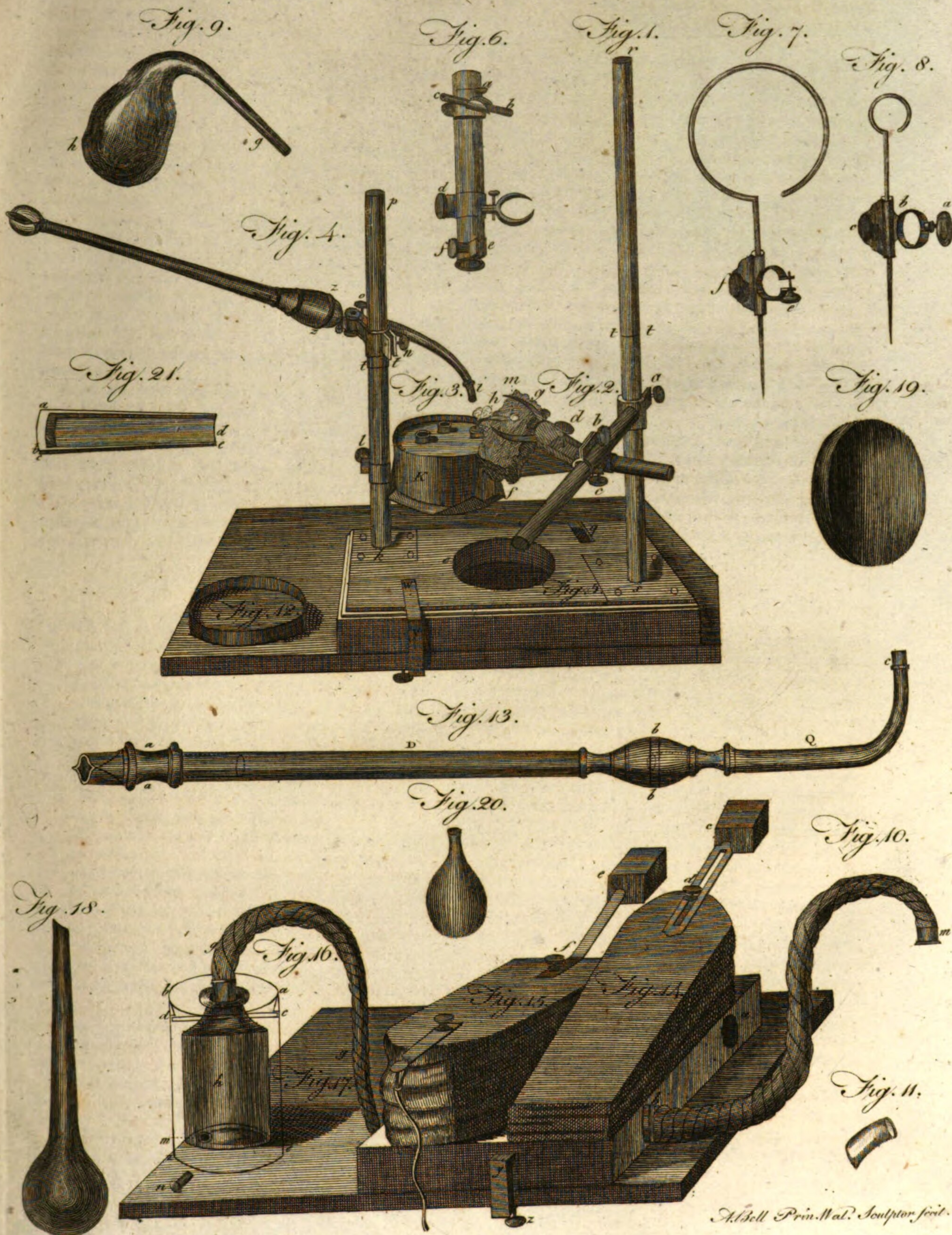
[*N.B.* 1. This double bellows is packed up by itself in a mahogany case, about 9 inches long, $6\frac{1}{2}$ wide, and about $3\frac{1}{4}$ deep, outside measure. 2. The last blowing bellows, fig. 14. has an inside valve, which opens when the upper surface of it is at its greatest height; in order to let the superfluous air escape out, as it would otherwise issue with great velocity out of the tube, fig. 11. and spoil the operation.]

If the operator chooses to apply the vital or dephlogisticated air in his process, let him fill the glass-jar *b*, fig. 17. with this air; and put it within the tub marked by *abze*, filled with water, fastening the neck of the jar within by a cross-board *ed*, which has a hole in it for that purpose; then introducing the two ends of the flexible hollow tube, fig. 16. both to the mouth of the jar and to the hole of the bellows fig. 15. he opens the hole *m* of the jar, that was stopped with the stopple *n*; the column of the water passes in through *m*, and forces up the vital air, which enters the bellows, and of course, by the alternate motion of the pedal, passes through the end of the blow-pipe, to urge the flame upon the piece of ore *m*, fig. 2. on the charcoal *g*. But the dephlogisticated air may be also received at the same time that it is produced, by tying the pipe, fig. 16. to the mouth of an earthen retort, or even of a glass retort well-coated, according to the method of Mr Willis, described in the Transactions of the Society of Arts, Vol. V. p. 96. This last consists in dissolving two ounces of borax in a pint of boiling water, and adding to the solution as much slacked lime as is necessary to form a thin paste. this glass retort is to be covered all over with it, by means of a painter's brush, and then suffered to dry. It must then be covered with a thin paste made of linseed oil and slacked lime, except the neck that enters into the receiver. In two or three days it will dry of itself; and the retort will then bear the greatest fire without cracking. Two ounces of good nitre, being urged in the retort, by a good fire on a chafing-dish, will afford about 700 or 800 ounce-measures of dephlogisticated air.

To make any other kind of chemical assays, the forceps of fig. 2. which supports the charcoal, is taken off, by unscrewing the screw *b*; the blow-pipe is also taken off, by loosening the screw *n*; the hoop fig. 7. is put in its place, where the metallic basin of fig. 19. is put filled with sand: the piece of fig. 8. is set on the other pillar *rs*, fig. 1. to hold the matras, fig. 18. upright, or the receiver fig. 20. &c.

In the same manner, the retort, fig. 9. may be put in the sand-bath instead of the matras, with its receiver fig. 20. which may be supported on a bit of cork or wood, hollowed to its figure, and held by the pliers, instead of the charcoal fig. 2.

But if the operation is to be made in the naked fire,



Of
Arrangement.Of
Arrangement.

fire, the neck of the retort, fig. 9. being luted to the receiver, or balloon, fig. 20. may be hanged by a little chain with its ring over the flame, being suspended from the piece of fig. 7. or 8. screwed to either of the pillars as may be most convenient. Otherwise the receiver, fig. 20. may be supported by the round hoop of brass, fig. 8. or 7. screwed at a proper height to the pillar, fig. 1. tying round it some packthread to defend the glass from the contact with the metallic support.

The piece of fig. 6. may be screwed by its collar and screw *ef* to any of the pillars; carrying with it the retort and its receiver, at proper distances, higher or nearer to the lamp according as the flame is more or less violent.

It easily may be conceived, that these implements afford all sorts of conveniences for making any kind of small operations and assays in miniature, provided the operator pays a proper attention to the disposition requisite for each process or operation.

Every glass retort, receiver, matras, bason, small funnels, &c. are made by the lamp-workers, that blow beads, thermometers, and other small glass instruments.

It is directed that the lamp *k*, fig. 3. be filled with spirit of wine, because it gives no disagreeable smell, and does not produce any fuliginous and disagreeable crust on the vessels as oil does: moreover, the spirit gives a dry flame, without smoke, and stronger than oil; besides the spots and disagreeable consequences this last causes, if split, &c. M. de Morveau adds, that the expence of spirit is quite inconsiderable; and that he performed in eight or ten

minutes, with this apparatus, various dissolutions, evaporations, and other processes, which otherwise would have taken more than three hours, with the expence only of two or three halfpence for the spirit of wine, whilst the fuel of charcoal would have cost near ten or eleven pence.

But a very important circumstance is, as Morveau observes likewise, that many philosophers do not apply themselves to chemical operations, for want of opportunity of having a laboratory to perform them: it requiring a proper room, and suitable expences of many large furnaces, retorts, crucibles, and numerous other implements, &c. whilst these miniature laboratories may in great measure afford the same advantages; at least to that degree of satisfaction sufficient to ascertain the contents and products of any substance that is subjected to trial: for with this simple apparatus a man of some abilities may, without any embarrassment, in a very short time, and with little expence, perform such distillations as require a reverberatory furnace; all sorts of processes, digestions, and evaporations, which require a regular sand heat; he may vary his experiments or trials, and multiply them to a great number of various performances, draw up his conclusions, and reason upon them, without loss of time, without the hinderance of long preparations to work at large. And even when such large works are to be performed, he may observe beforehand various phenomena of some substances, which being known in time, would otherwise impede the processes at large, or make them fail absolutely; and all this without the risk of a considerable loss, and without exposing himself to a great fire, &c.

PART II. ARRANGEMENT (A) of MINERAL BODIES (B).

THE bodies belonging to the mineral kingdom are divided into four different classes, viz.

1. *Earths* (c), or those substances which are not ductile, are mostly indissoluble in water or oil, and preserve their constitution in a strong heat.
2. *Salts*: these dissolve in water, and give it a taste; and when the quantity of water required to keep them in dissolution is evaporated, they concrete again into solid and angular bodies.
3. *Inflammables*, which can be dissolved in oils, but not in water, and are inflammable.
4. *Metals*, the heaviest of all bodies; some of which are malleable, and some can be decomposed.

Here, however, it must be observed, that these classes are unavoidably blended one with another; and therefore some exceptions must be allowed in every one of them: for instance, in the first class, the calcareous earth is in some measure dissoluble in water, and pipe-clay with some others diminish somewhat in their bulk when kept for a long time in a calcining heat.

In the third class, the calx of arsenic has nearly the same properties as salts; and there is no possible definition of salt that can exclude the arsenic, though at the same time it is impossible to arrange it elsewhere than among the semimetals. In the fourth class it is to be observed, that the metals and semimetals, perfect or imperfect, have not the same qualities common to them all; because some of them may be calcined, or deprived of their phlogiston, in the same degree of fire in which others are not in the least changed, unless particular artifices or processes are made use of: some of them also may be made malleable, while others are by no means to be rendered so. That the convex surface metals take after being melted, is a quality not particularly belonging to them, because every thing that is perfectly fluid in the fire, and has no attraction to the vessel in which it is kept, or to any added matter, takes the same figure; as we find borax, *sal fusibile microcosmicum*, and others do, when melted upon a piece of charcoal: therefore, with regard to all that has

(A) According to the system of *Cronstedt* †; altered, augmented, and improved from the Observations of other Mineralogists.

(B) Of the different bodies enumerated in the following classification, full explanations are given under their respective names as they occur in the course of this Work. See also METALLURGY, and CHEMISTRY-Index.

(c) By *earths*, the author (Mr Cronstedt) does not mean (strictly speaking) only earths, but includes under that title all the kinds of stones or fossils not inflammable, saline, or metallic.

† *Cronstedt's Mineralogy*, 2d edition, in 2 vols, by Magellan.

EARTHS. has been said, it is hardly worth while to invent such definitions as shall include several species at once; we ought rather to be content with perfectly knowing them separately.

These bodies are here arranged according to their constituent parts, so far as hitherto discovered; and are divided into five orders. See the article EARTH. Calcareous EARTHS.

CLASS I. EARTHS.

EARTHS, are those mineral bodies, not ductile, for the most part not dissoluble in water or oils, and which preserve their constitution in a strong heat.

Order I. CALCAREOUS EARTHS (D).

THE properties of these are as follow:

1. Friability and falling into a fine white powder after calcination.
2. Partial solution in water, with which they contract

(D) Calcareous earth is most commonly found in the form of lime-stone; hard, compact, and of various colours; under which general name may be comprehended all the different kinds of marbles. Near Bath in England is found a kind of grey stone, rather soft than hard. This contains calcareous earth in a mild state, and likewise some in a state of causticity; hence, when newly dug out of the earth, it will dissolve sulphur, or make lime-water without any calcination. By attraction of fixed air from the atmosphere, it soon hardens after it has been dug up.

Mr Williams * divides the lime-stones of Scotland into the following species:

1. Grey, whitish, and pure white; regularly stratified; of a granulated texture; and much used in the Highlands for building bridges. Some of it is composed of fine glittering spangles like the scales of fishes; and some is as pure white as the best refined sugar, which kind he thinks may be called *Parian marble*.

2. Coarse-looking grey mountain limestone, hard and strong, of a granulated texture, difficult to work in some places rough and unequal, in others smooth and even. Sometimes regularly stratified, at other times appearing like one vast irregular bed or rock, of various thicknesses.

3. Ash-coloured mountain-limestones, consisting of small grains of a fine smooth texture; when broken resembling flint. In the Highlands there are hills of this kind of stone, which our author informs us he has seen; some of which have regular strata, while others appear in one vast mass like a rock of granite.

4. Regularly-stratified lime-stone, found in the low countries, exhibiting a vast variety of colours; as black, blue, grey, brown, purple, red, and ash-coloured, with various mixtures, of all degrees of hardness and purity.

5. Limestone accompanying coal, and frequently the immediate roof of the vein. This likewise shows a great variety of colour, texture, and quality; some being so much adulterated with clay and other heterogeneous mixtures as to be good for nothing, while others are very pure and fine. These limestones are always found in regular strata. "They are found (says our author) as regular as the coals they accompany; and the coal-strata are more regular in continuation upon the bearing, as far as the class of strata belonging to the coal reaches, than any other that I have investigated; and I look upon it, that this observation may be of use in practice."

For discovering limestone at some distance, Mr Williams gives the following directions:—"Let them keep the line of stretch, or bearing of the strata; and, in the coal country, they will be sure to discover it at nearly the same parallel distance from a seam of coal or other given stratum, as the place where it was last seen. But many of the mountain-limestones are not much to be depended on. Though you may have a good and plentiful quarry in one place, yet, perhaps, half a mile, or half a quarter of a mile farther forward, you cannot discover it: it is dwindled away to nothing, and yet will appear again farther forward; which makes the mountain-limestones uncertain to be discovered where you do not see them; as these rocks very frequently grow thicker or thinner, and sometimes squeezes out to nothing: and I comprehend under this denomination all the limestones not accompanying the coals and coal-metals.—The limestones of the coal-fields are often distinguishable by containing a great variety of shells, coral, and other marine bodies, which are found blended in the heart and composition of the stone."

6. The Scotch marbles are of great variety and beauty; and the parts of the kingdom most unfit for cultivation are found to abound most in them. Affint in Sutherland has a kind of white statuary marble, which Mr Williams says is the purest and best he ever saw. "I am persuaded (says he) there is none better, if any so good, in all Europe, and there is enough of it to serve all Britain; perfectly solid and pure, free of any blemishes, flaws, or stains, and blocks or slabs of any size may be cut out: but there is bad access to it; nor would it be easily quarried, there being a little cover above it, of a soft, loose, whitish limestone. This marble accompanies a prodigious rock of grey limestone, of a granulated texture, appearing in regular strata at Affint; but it is one of those which varies in thickness as you advance along the bearing of the strata. The good white marble of Affint is only to be seen in the bed of the river, near a considerable house a mile or two south of the church; but I cannot remember the name of the particular place."

Near Blairgourie in Perthshire, not far from the side of the high road, is an excellent, granulated, broad-bedded limestone, of a sugar-loaf texture, and as white as the finest statuary marble, which Mr Williams supposes to be a good species of the true Parian marble, and that it requires only to be known and brought into use to become of great value. In the duke of Gordon's lands, in the forest of Glenavon, there is also a kind of marble composed of broad glittering grains like spangles, as large as the scales of fishes; but the situation is remote, and difficult of access.

* Nat. Hist.
of the
Mineral
Kingdom,
2 vols.

Calcareous
EARTHS.Calcareous
EARTHS.

tract great heat, and by sprinkling with water they fall more readily into powder.

3. Infusibility without addition.

4. They attract the fixed air from the vegetable and mineral alkalies, and thus rendering them much more caustic, becoming at the same time mild themselves.

5. Solubility in all acids except the vitriolic, tartarous, and some anomalous vegetable acids.

6. Fusibility with borax and microcosmic salts.—The fusion is attended with effervescence, and the result is a transparent and colourless glass.

7. With metalline calces they melt into a currosive slag.

8. They imperfectly reduce the calces of lead and bismuth, and have even some effect upon those of copper and iron.

The calcareous earth is found,

I. Pure.

1. In form of powder. *Agaricus mineralis*, or *lac lunæ*.

a. White, in moors, and at the bottom of lakes.

b. Red.

c. Yellow.

2. Friable and compact. Chalk, *creta*.

a. White, *creta alba*. Chalk is a name also applied to other earths; whence we hear of chalks of various colours: but there are none which are known to be of a calcareous nature, except this kind here described, and of which there are no other varieties, otherwise than in regard to the looseness of the texture, or the fineness of the particles.

3. Indurated, or hard; Limestone; *Lapis calcareus*.

A. Solid, or not granulated.

a. White.

b. Whitish yellow.

c. Flesh-coloured, found in loose masses.

d. Reddish brown.

e. Grey.

f. Variegated with many colours, and particularly called *marble*.

g. Black.

B. Grained or granulated limestone.

1. Coarse-grained, and of a loose texture, called *salt-flag* in Swedish, from its resemblance to lumps of salt.

a. Reddish yellow. b. White.

2. Fine-grained.

a. White. b. Semi-transparent, from Solfatara in Italy, in which native brimstone is found.

3. Very fine grained.

a. White and green. b. White and black.

C. Scaly limestone.

1. With coarse or large scales.

a. White. b. Reddish yellow.

2. With small scales.

a. White.

3. Fine glittering or sparkling.

a. White. b. Of many colours.

D. Lime or calcareous spars.

(1.) Of a rhomboidal figure.

A. Transparent or diaphanous.

1. Refracting spar; *Spatum islandicum*; Iceland spar, or Iceland crystal.—This represents the objects seen through it double,

2. Common spar, which shows the object single.

a. White, or colourless.

b. Yellowish and phosphorescent.

B. Opaque.

1. White. 2. Black. 3. Brownish yellow.

(2.) Foliated or plated spar.

a. Opaque white.

E. Crystallized calcareous spars. *Spar. Drusen* (E.)

(1.) Transparent.

a. Hexagonal truncated.

b. Pyramidal.

1. Dog's teeth; *Pyramidales distinctæ*.

2. Balls of crystallized spar, *Pyramidales concretæ*.

F. Stalactitical spar; *Stalactites calcareus*. Stalactites, Stone-icicle, or Drop-stone.

(1.) Scaled stalactites of very fine particles.

a. Of a globular form.

1. White, the pea-stone.

2. Grey, *pisolithus*, *oolithus*. Also the hammites, from its resemblance to the roes or spawn of fish. It has been exhibited by authors as petrified roes. The Ketton free-stone, of Rutlandshire, is a remarkable stone of this sort.

b. Hollow, in the form of a cone.

1. White.

c. Of an indeterminate figure.

d. Of coherent hollow cones.

(2.) Solid stalactites of a sparry texture.

a. Hollow, and in form of a cone.

1. White, and semitransparent.

II. Sa-

In Lochaber, near the farm-houses on the north side of the ferry of Ballachylish, is a limestone or marble rock, of a beautiful ashen-grey colour, and a fine regular uniform grain or texture; capable of being raised in blocks or slabs of any size, and of receiving a fine polish. It is beautifully sprinkled with fine bright grains of mundick or pyrites, and likewise with grains or specks of beautiful lead ore of a fine texture.

About three miles south of Fort-William, in the bed of a river, is a curious kind of marble with a black ground, flowered with white, like fine needle-work, or rather resembling the frost flowering upon glass windows in winter; and this flowering is not only on the outside, but quite through all parts of the body of the stone.

Scotland has also chalk in abundance; some of which is regularly stratified, and much appears in thick irregular masses like sediment.

(E) The translator of Mr Cronstedt's Treatise has adopted this German term *drusen* into the English language, for a cluster of regular figured bodies, as a groupe conveys the idea of a cluster only, whether regular or of indeterminate figures.

Calcareous
EARTHS.II. Saturated or combined with the acid of vitriol.
Gypsum, Plaster-stone, or Parget.

1. Looser and more friable than a pure calcareous earth.
2. Either crude or burnt, it does not excite any effervescence with acids; or, at most, it effervesces but in a very slight degree, and then only in proportion as it wants some of the vitriolic acid to complete the saturation.
3. It readily falls into a powder in the fire.
4. If burnt, without being red-hot, its powder readily concretes with water into a mass, which soon hardens; and then,
5. No heat is perceived in the operation.
6. It is nearly as difficult to be melted by itself as the limestone, and shows mostly the same effects with other bodies as the lime-stone: the acid of vitriol seems, however, to promote its vitrification.
7. When melted in the fire with borax, it puffs and bubbles very much, and for a long while, during the fusion, owing to the nature of both the salts.
8. When a small quantity of any gypsum is melted together with borax, the glass becomes colourless and transparent; but some sorts of alabaster and sparry gypsum, when melted in some quantity with borax, yield a fine transparent yellow coloured glass, resembling that of the best topazes. This phenomenon might probably happen with every one of the gypseous kind. But it is to be observed, that if too much of such gypsum is used in proportion to the borax, the glass becomes opaque, just as it happens with the pure limestone.
9. Burnt with any inflammable matter, it emits a sulphureous smell; and may as well by that means, as by both the alkaline salts, be decomposed; but for this purpose there ought to be five or six times as much weight of salt as of gypsum.
10. Being thus decomposed, the calx or earth which is left shows commonly some marks of iron.

The gypseous earth is found,

(1.) Loose and friable. Gypseous earth, properly so called; *Gubr.*

A. White.

(2.) Indurated.

A. Solid, or of no visible particles, Alabaster.

a. White, alabaster.

1. Clear and transparent.

2. Opaque.

b. Yellow.

1. Transparent, from the Eastern countries.

2. Opaque.

B. Gypsum of a scaled or granulated structure. This is the common plaster-stone.

1. With coarse scales. a. White.

2. With small scales. a. Yellowish. b. Greyish.

C. Fibrous gypsum, or plaster-stone, improperly (though commonly) called *English talc* by our druggists.

1. With the fibres coarse. a. White, from Livonia.

N^o 222.

2. With fine fibres. a. White.

D. Spar-like gypsum. Selenites, by some also called *glacies maris*; and confounded with the clear and transparent mica.

1. Pure selenites.

A. Transparent.

a. Colourless. b. Yellowish.

2. Liverstone, so called by the Swedes and Germans.

E. Crystallified gypsum. Gypseous drusen.

(1.) Drusen of crystals of pure sparry gypsum.

A. Wedge-formed, composed of a pure spar-like gypsum.

a. Clear and colourless. b. Whitish yellow.

B. Capillary.

a. Opaque, whitish yellow. b. Hexagonal, prismatic. c. Globular, consisting of cuneated rays proceeding from the centre.

F. Stalactitical gypsum. *Gypsum finter.*1. Of no visible particles; in French, *grignard.*

A. Of an irregular figure.

a. Yellow. b. White.

2. Of a spar-like texture.

A. In form of a cone.

a. White and yellow.

B. Of an irregular figure.

a. White.

III. Calcareous earth saturated with the acid of common salt. *Sal ammoniacum fixum naturale.*

This is found, 1. In sea-water. 2. In salt-pits.

IV. Calcareous earth combined or saturated with sparry acid, known by the name of *sparry fluor* and *blue john.*These are commonly called *fluxing*, *vitrescent*, or *glass-spars*; because most part of them have a sparry form and appearance: they are, however, often met in an indeterminate figure.

They are only known in an indurated state, and distinguish themselves from the other earths by the following characters.

1. They are scarce harder than common calcareous spars, and consequently do not strike fire with steel.
2. They do not ferment with acids neither before nor after calcination.
3. They do not melt by themselves; but crack and split to pieces when exposed to a strong fire. But,
4. In mixtures with all other earths they are (generally) very fusible, and especially with calcareous earth, with which they melt into a corroding glass that dissolves the strongest crucibles, unless some quartz or apyrous clay be added thereto.
5. When heated slowly, and by degrees, they give a phosphorescent light: but as soon as they are made red-hot, they lose this quality. The coloured ones, especially the green, give the strongest light, but none of them any longer than whilst they are well warm.
6. They melt and dissolve very easily by the addition of borax; and, next to that, by the microcosmic salt, without ebullition.

A. Indurated fluor.

2

(1.)

Calcareous

Calcareous
EARTHS.

- (1.) Solid, of an indeterminate figure; of a dull texture, semitransparent, and full of cracks in the rock.

a. White.

- (2.) Sparry fluor. This has nearly the figure of spar; though on close observation it is found not to be so regular, nothing but the glossy surfaces of this stone giving it the resemblance of spar.

a. White. b. Blue. c. Violet. d. Deep green. e. Pale green. f. Yellow.

- (3.) Crystallised fluor.

1. Of an irregular figure. a. White. b. Blue. c. Red.

2. Of a cubical figure. a. Yellow. b. Violet.

3. Of a polygonal spherical figure. a. White. b. Blue.

4. Of an octoedral figure. a. Clear, colourless.

V. Calcareous earth saturated with a particular acid, perhaps of the metallic kind, viz. the tungstic acid. The *tungstein* of the Swedes.

This resembles the garnet-stone and the tin-grains; is nearly as heavy as pure tin; very refractory in the are, and excessively difficult to reduce to metal. Iron has, however, been melted out of it to more than 30 per cent. It is very difficultly dissolved by borax and alkaline salts, but melts very easily with the microcosmic salt, giving a black slag; and for this reason the last mentioned salt must be employed in the assays of this stone. It is found,

1. Solid and fine-grained.

a. Reddish or flesh-coloured. b. Yellow.

2. Spathose, and with an unctuous surface.

a. White. b. Pearl-coloured.

VI. Calcareous earth united with the inflammable substance.

These have a very offensive smell, at least when rubbed. They receive their colour from the phlogiston, being dark or black in proportion as it predominates.

- (1.) Calcareous earth mixed with phlogiston alone; *Lapis fuillus*, fetid stone and spar, or swine-stone and spar.

A. Solid, or of no visible or distinct particles.

a. Black.

B. Grained.

a. Blackish brown.

C. Scaly, *particulis micaceis*.

1. With coarse scales, a. Black.

2. With fine sparkling scales. a. Brown.

D. Sparry.

a. Black. b. Light brown. c. Whitish yellow.

E. Crystallised.

1. In a globular form.

VII. Calcareous earths blended with an argillaceous earth. Marle, *Marga*.

1. When crude, it makes an effervescence with acids: but,

2. Not after having been burnt; by which operation it is observed to harden, in proportion as the clay exceeds the calcareous substance.

3. It easily melts by itself into a glass, and even when it is mixed with the most refractory clay.

4. It is of great use in promoting the growth of vegetables, since the clay tempers the drying quality of the calcareous earth.

5. When burnt in a calcining heat, it readily attracts water: and, exposed to the air, in time it falls into a powder.

The varieties of this kind worthy to be taken notice of, depend on the different quantities of each of their component parts, and on the quality of the clay. The following are specified as examples.

A. Loose and compact, *Marga friabilis*.

a. Reddish brown.

b. Pale red. This, when burnt, is of a yellowish colour, and used for making earthen ware in some places.

B. Semi-indurated; which is nearly as hard as stone when first dug up, but moulders in the open air.

a. Grey. b. Red.

C. Indurated, or stone marle.

a. in loose pieces, *Marga indurata amorphia*; by the Germans called *duckstein* or *tophstein*.

a. White. b. Grey, formed from a sediment which the water carries along with it.

b. In continued strata. Hard slaty marle.

VIII. Calcareous earth united with a metallic calx.

Here, as well as in the others, such a mixture or combination is to be understood, as cannot be discovered by the eye alone without the help of some other means.

The subjects belonging to this division lose the property of raising an effervescence with acids, when they are rich in metal, or contain any vitriolic acid. However, there have been found some that contained 20 or 30 per cent. of metal, and yet have shown their calcareous nature by the nitrous acid.

There are no more than three metals hitherto known to be united in this manner with the calcareous earth, viz.

- (1.) With iron. White spar like iron ore, *Minera ferri alba*. The *Stahlstein* or *weisses eisenertz* of the Germans.

1. This ore, however, is not always white, but commonly gives a white powder when rubbed.

2. It becomes black in the open air, as likewise in a calcining heat.

3. In this last circumstance it loses 30 or 40 per cent. of its weight, which by distillation has been found owing to the water that evaporates; and it is possible that some small quantity of vitriolic acid may, at the same time, evaporate with the water.

4. It is of all the iron ores the most easy to melt, and is very corrosive when melted.

This kind is found,

A. Loose; the mouldered part of the indurated sort.

a. Black, like foot.

b. Dark brown, somewhat resembling umbre.

B. Indurated.

1. Solid, of no distinct particles.

a. Red. Looks like red ochre, or the red hæmatites, but dissolves in the acid of nitre with a great effervescence.

2. Scaly, *particulis micaceis*.

a. White.

b. Blackish grey.

3. Spar-like.

a. Light brown.

4. Drusen.

4. Drusen.

a. Blackish brown.

b. White.

1. Porous. This is often called *eisenblute*, or *flos ferri*.

2. Cellular.

(2.) With copper.

A. Loose and friable. Mountain blue; Germanicè, *Bergblau*. This dissolves in aquafortis with effervescence.

B. Indurated.

1. Pure calcareous earth mixed with calx of copper. Armenian stone, *lapis Armenus*.2. Gypseous earth united with calx of copper. Is of a green colour; and might perhaps be called *turquoise ore*, or *malachites*; though we do not know if all sorts of turquoise ore are of this nature.

a. Semi-transparent, is found at Ardal in Norway.

(3.) With the calx of lead.

This is a lead ochre, or a spar-like lead-ore, which, in its formation, has been mixed with a calcareous earth, and for that reason effervesces with acids.

A. Loose and friable.

1. White.

B. Indurated.

1. Scaly.

a. Yellowish.

Both these varieties contain a considerable quantity of lead, viz. 40 per cent. more or less; and the calcareous earth is as equally and intimately mixed with it, as in the white iron ore.

IX. The following compounds of calcareous earth with different mineral substances are added from Mr Kirwan's Elements of Mineralogy.

1. A compound of calcareous and barotical earths: of this species are some yellowish stones found in Derbyshire, consisting of lumps of limestone interspersed with nodules of baroselenite. Many more may occur as compounds of gypsum and baroselenite, fluor and baroselenite, &c. &c.

2. Compounds of calcareous and magnesian earths; such as,

a. The white marble, interspersed with spots of steatites or soap-rock, either green or black, called by Cronstedt *kolmord marble*. This marble is of a scaly texture.b. The *pietra talchina* of the Italians, which consists of white spar with veins of talc.c. The *verde antico* of the Italians, which is a light green marble, with deep green, black, white, and purple spots. According to Mr Bayen, it contains 62 parts of mild calcareous earth, 30 of green talc, 1 of magnesia, and 1 of semiphlogisticated iron.

3. Compounds of calcareous and argillaceous earths; such as,

a. The green Campan marble from the Pyrenées. It is slaty and somewhat magnetic. According to Mr Bayen, it contains 65 of mild calcareous earth, 32 of the argillaceous, and 3 of semiphlogisticated iron.

b. The red Campan marble: this is not magnetic; it contains 82 parts of mild calcareous earth, 11 of argillaceous schistus, and 7 of dephlogisticated iron.

c. Yellow figured marble from Florence: according to Mr Bayen, it contains 75 parts of mild calcareous earth, 13 or 14 of schistus, and 4 or 5 of dephlogisticated iron.

d. Griotte marble from Autun of Burgundy in France: it contains 67 parts of mild calcareous earth, 26 of reddish schistus, 2 of iron, and 1 of magnesian earth.

e. The Amandola, which is a green marble, honey-comb like, with white spots. It contains 76 parts of mild calcareous earth, 20 of schistus, and 2 of semiphlogisticated iron. The cellular appearance proceeds from the schistus.

4. Compounds of calcareous earth and mica; such as,

a. The cipolin from Autun in France: it is of a green colour, and consists of 83 parts of chalk, 12 of green mica, and 1 of iron.

b. The micaceous limestone, is of a glittering appearance, of various degrees of hardness, and effervesces with acids. Such as the macigno of the Italians; their yellow pietra bigia; and their blue pietra columbina or turkina.

5. Compounds of calcareous and siliceous earths; such as,

a. The calcareous quartz and pudding-stone: this consists of lumps of quartz, and sometimes of felt-spar in a calcareous cement.

b. The limestone with veins of quartz; such as the *saxum sablbergense*, and several marbles of Sweden and Siberia, which strike fire with steel.

6. Calcareous volcanic pudding-stone; such as,

a. The cierchina, which consists of lumps of spar and lava in a calcareous cement, mentioned by Mr Ferber.

b. The marble mixed with veins of black or green lava, mentioned by the same author.

7. Compounds of calcareous earth, mixed with two or more kinds of earth; such as,

a. The cipolin from Rome, which is a green marble with white zones: it strikes, though difficultly, fire with steel: it contains 67,8 parts of mild chalk, 25 of quartz, 8 of schistus, and 0,2 of iron, besides the iron contained in the argillaceous schistus.

b. The calcareous porphyry, which consists of quartz, felt-spar, and mica in separate grains united by a calcareous cement.

c. The limestone interspersed with shoerl and mica.

d. To these compounds belongs the pyritaceous limestone called by the French *Pierre de St Ambroix*. It is of an iron grey colour, interspersed with shining particles. Its texture is compact, and scarcely gives fire with steel. Its specific gravity is 2,7034. It is soluble in acids, and mostly with effervescence; calcines in a strong fire; makes nitre slightly detonate; and if distilled affords a small portion of vitriolic acid, and some sulphur sublimes. Its component

Ponderous
EARTHS.

ponent parts are 75 of mild calcareous earth and 25 of pyrites; in which are contained 14 of argill, 7 of quartz and sulphur, and 4 of iron.

Order II. PONDEROUS EARTH.

PONDEROUS earth, (*Terra Ponderosa*): Chalk, or calc. See EARTH, Art. I. This is a particular kind of earth (like chalk in appearance, but with some very different properties), discovered in Sweden about 1774, which by its results with other bodies has some similarity to the known alkalis. It has not yet been found pure, but mixed with other substances: however, its great specific weight easily distinguishes it from the others, it being the heaviest of all earths.

1. Its specific gravity when considerably purified by art is 3,773.
2. This earth combines with aerial acid: and in this case effervesces with stronger acids.
3. With vitriolic acid it forms the ponderous spar, which is insoluble in water.
4. Its crystallization, after being combined with the nitrous, or with the muriatic acids, is hardly soluble;
5. But with acetous acid, it becomes deliquescent.
6. When pure; viz. without any mixture of acid or alkali, it does not vitrify in the fire.
7. If deprived of the aerial acid (fixed air) by calcination, is then soluble in 900 times its weight of boiling water. This solution exposed to air, forms a cremor, like that of lime-water in the same circumstances, and like it changes also the vegetable colours.
8. Whilst combined with aerial acid, it is only soluble in about 1550 times its weight of water, chiefly if the water has been impregnated also with the same aerial acid.
9. It expels the caustic volatile alkali from ammoniacal salt.
10. Mixed with brimstone it produces a hepar sulphuris, whose solution in water is but incompletely decomposed either by the nitrous or the muriatic acid, on account of the great attraction between this earth and the acid of sulphur, which is so strong that it
11. Separates this acid (the vitriolic) from the vegetable alkali.

I. Combined with aerial acid; *Terra ponderosa aërata*. See CHEMISTRY-Index.

It resembles alum, but is hard and striated, as if composed of radiating fibres coming from a centre. It is found in Alston-moor in England.

A. Spar-like gypsum.

1. Semitransparent, *spatum Bononiense*. The Bononian stone, or native phosphorus.

2. Opaque. a. White. b. Reddish.

B. Ponderous Drusen spar.

1. Jagged, *crislatum*. These resemble cock's combs, and are found in clefts and fissures accreted on the surfaces of balls of the same substance.

2. White.

3. Reddish.

II. United with phlogiston and the vitriolic acid.

Leberstein of the Germans and Swedes. *Lapis Magnesian* *hepaticus*. EARTHS.

This stone in some specimens constantly, but in others only when rubbed, smells like the *hepar sulphuris*, or gun-powder.

It is found.

A. Scaly.

1. With coarse scales. a. Whitish yellow.

2. With fine sparkling scales. a. Black.

Order III. MAGNESIAN, MICACEOUS, and ASBESTINE EARTHS.

§ 1. *Magnesian Earths*.

MAGNESIA is a white, loose, and light earth, only known since the beginning of this century. It is generally found combined or mixed with other heterogeneous substances, as other simple earths are.

1. When pure its specific gravity is 2,330, and then
2. It neither hardens, contracts, nor melts by the application of heat, even by the solar rays.
3. But it melts easily with borax, or microcosmic salt; though it is scarcely affected by fixed alkalis or calces of lead.
4. Mixed with other earths, it produces by fire different hard masses.
5. It gives no causticity except to the volatile alkali: and
6. Does not effervesce with any acid.
7. When mixed with water it shows a very small degree of heat, but without any effervescence. And when the water exceeds the weight of magnesia about 7,692 times, it is totally dissolved.
- 8 and 9. Being put in water and afterwards dried, it contains $\frac{1}{100}$ parts of its weight; though when saturated with aerial acid, it will absorb and retain after being dried $\frac{66}{100}$ parts of water.
10. This earth combined with aerial acid is more soluble in cold than in hot water.
11. Combined with vitriolic acid it crystallizes into a bitter salt, known by the name of *Epsom* and *Seydlitz* or *Seidtschulitz* salt, which is soluble in little more than its own weight of water.
12. With nitrous acid it forms a deliquescent salt.
13. With the muriatic or the acetous acids it does not crystallize: and the mass being dried, attracts humidity from the air.
14. It has a stronger attraction to the fluor acid than to any other (Berg.): and crystallizes with it into hexangular prisms whose ends are formed of two low pyramids, of three rhombs (*Romé de l'Isle*).
15. It is not precipitated from other acids by the vitriolic, as calcareous earth is.
16. According to Lavoisier and Macquer, when magnesia is calcined, it becomes phosphorescent.

I. Magnesia combined with vitriolic and other acids.

A. When saturated with the vitriolic acid, it forms a bitter salt, called *English* or *Epsom*, *Seydlitz* or *Sedlitz* salt. The salts known under these dif-

ferent names only differ from one another on account of some heterogeneous substance, which is combined in them, the vitriolated magnesia being the characteristic and principal ingredient in them all.

B. Magnesia is found not only combined with the vitriolic acid in the waters of Epsom, Sedlitz, &c. but also with the marine acid to a considerable quantity in sea-water and other salt springs.

C. It is contained frequently in fresh waters, where it is dissolved by means of a quantity of aerial acid.

II. Combined with other earths.

A. Magnesia, when combined with siliceous earth, is commonly unctuous to the touch, and more or less difficult to be cut or turned in proportion to its different degrees of hardness.

It is not diffusible in water: grows hard, and is very refractory in the fire.

When pounded and mixed with water, it will not easily cohere into a paste: however, if it is managed with care, it may be baked in the fire to a mass, which being broken, shows a dull and porous texture.

It takes for the most part, and without much labour, a fine polish. It is found,

(1.) Compact and soft; *Smedis*, *Briançon* or French chalk.

a. White, from the Lands-End, in Cornwall.

b. Yellow.

c. Red and white, from the Lands-End: the soap-earth, from Switzerland: it looks like Castile-soap.

(2.) Solid and compact; of impalpable particles: Steatites or soap-rock.

a. White, or light green. b. Deep green — c. Yellow.

(3.) Solid, and of visible particles; serpentine stone.

A. Of fibrous and coherent particles.

This is composed, as it were, of fibres, and might therefore be confounded with the asbestos, if its fibres did not cohere so closely with one another, as not to be seen when the stone is cut and polished. The fibres themselves are large, and seem as if they were twisted.

a. Deep green. It is sold for the *lapis nephriticus*, and is dug at some unknown place in Germany. b. Light green, from Skiensthyttan, in Westmanland; is used by the plate-smiths instead of French chalk.

B. Of granulated particles; fine grained serpentine stone, the Zoebnitz serpentine.

a. Black. b. Deep green. c. Light green. d. Red. e. Bluish grey. f. White. These colours are all mixed together in the serpentine stone from Zoebnitz, but the green is the most predominant colour.

B. Porcelain earth mixed with iron; *terra porcellanea* This is,

A. Diffusible in water.

a. Red, from Montmartre, and China. The water-clinkers which are imported from certain places in Germany seem to be made of this kind.

B. Indurated.

1. Martial soap earth.

a. Red.

2. Martial soap rock.

a. Black.

b. Red.

C. The telgsten of the Swedes; *lapis ollaris*.

a. Light grey. b. Whitish yellow. c. Dark grey. d. Dark green.

The serpentine stone has many varieties; being found, (1.) Veined or spotted with green steatites. (2.) Red, with veins of asbestos. (3.) Red, green, yellow, or black with veins or spots of white calcareous spar, is called *potzevera*. The black is called *nero di prato*; the green *verde di Suza*; but these names are not restrained to this species. (4.) Veined or spotted with gypsum. (5.) Veined or spotted with baroselenite. (6.) Veined or spotted with shiftus — And, (7.) With veins of quartz, felspar, or shoerl. (*Kirwan's Mineralogy*.)

What is commonly called *serpentine* is a true *lapis ollaris*; but being variegated with green, yellowish, and brown spots, like the skin of some common serpents, it is called by that name. Great quantities of this stone are found in Italy and Switzerland, where it is often worked into the shape of dishes and other vases. (*Fabroni*.) And the *gabro* of the Italians is nothing else but a kind of serpentine, (*Kirwan*.)

§ 2. Micaceous Earths.

These are known by the following characters:

1. Their texture and composition consist of thin flexible particles, divisible into plates or leaves, having a shining surface.

2. These leaves or scales exposed to the fire lose their flexibility and become brittle, and then separate into inner leaves: but in a quick and strong fire, they curl or crumple, which is a step towards fusion; though it is very difficult to reduce them into pure glass by themselves or without addition.

3. They melt pretty easily with borax, the microcosmic salt, and the alkaline salt: and may by means of the blow-pipe be brought to a clear glass with the two former salts. The martial mica is, however, more fusible than the uncoloured ones: its specific gravity is 3,000.

A. Colourless or pure mica; daze, glimmer, or glift.

1. Of large parallel plates; Muscovy glass. This is transparent as glass; found in Siberia and Eldalen in the province of Wermeland.

2. Of small plates, from Silfverberget, at Runneby, in the province of Blekinge.

3. Of fine particles like chaff; chaffy mica.

4. Of twisted plates; crumpled mica.

B. Coloured and martial glimmer.

1. Brown, semi-transparent.

2. Of fine and minute scales.

a. Brown. b. Deep green. c. Light green. d. Black.

3. Twisted or crumpled glimmer.

a. Light green.

4. Chaffy glimmer.

a. Black.

5. Crystallized glimmer.
 - a. Of concentrated and erect scales.
 - b. Of hexagonal horizontal plates.

The transparent Muscovy glass is used for windows, and upon all occasions where panes of glass are wanted. Perhaps it might also be advantageously employed to cover houses.

The twisted or crumpled mica, which is found at Hardol in Jemtland, is there manufactured into kettles and other vessels, as also for hearths of chimnies: and the powder which falls in the working may be mixed with the common salt for the distillation of the muriatic acid.

§ 3. Asbestine Earths.

These are only yet discovered in an indurated state; and their characters are as follows:

1. When pure, they are very refractory in the fire.
2. In large pieces they are flexible.
3. They have dull or uneven surfaces.
4. In the fire they become more brittle.
5. They do not strike fire with the steel.
6. They are not attacked by acids.
7. They are easily brought into fusion by borax or alkali.

In this section are included both those varieties which by fossilogists have been mentioned under the names of *amiantus* and *asbestus*, and have often been confounded together.

I. Asbestus, which is compounded of soft and thin membranes; *amiantus Wallerii*.

A. Of parallel membranes: *Corium, sive caro montana*; Mountain-leather.

1. Pure. a. White.
2. Martial. a. Yellowish brown.

B. Of twisted soft membranes; mountain cork.

1. Pure. a. White.
2. Martial. a. Yellowish brown.

II. Of fine and flexible fibres: Earth-flax; *asbestus Wallerii*.

A. With parallel fibres: *Byssus*.

1. Pure and soft. a. Light green. b. White.
2. A little martial, and more brittle.

a. Greenish, from Bastnas Grufva, at Ryddarhyttan in Westmanland. There it forms the greatest part of the vein out of which the copper ore is dug; a great part of it is consequently melted together with the ore, and is then brought to a pure semi-transparent martial slag or glass.

B. Of broken and recombined fibres.

1. Martial. a. Light green.

Order IV. SILICEOUS EARTHS.

SILICEOUS earth is, of all others, the most difficult to describe and to distinguish perfectly; however, it may be known by the following characters, which are common to all bodies belonging to this order.

1. In its indurated state it is hard, if not in regard to the whole, yet at least in regard to each particle of it, in a degree sufficient to strike fire with steel, and to scratch it, when rubbed against it, though the steel be ever so well tempered.
2. When pure, and free from heterogeneous par-

ticles, it does not melt by itself, neither in a reverberatory nor in a blast furnace.

3. After being burnt, it does not fall to a powder, neither in the open air nor in water, as the calcareous earth does, but becomes only a little looser and more cracked by the fire, unless it has been very slowly, and by degrees, heated.

4. It excites no effervescence with acids.

5. In the fire it melts easiest of all to a glass with the fixed alkaline salt; and hence it has got the name of vitrescent, though this name is, properly speaking, less applicable to this order than to a great many other earths.

To the above we may add the following properties, from Bergman.

6. It is not soluble in any of the known acids, the fluor-acid only excepted. But,

7. It may be dissolved by the fixed alkali, both in the dry and wet way.

8. If the fixed alkali is only half the weight of the siliceous earth, it produces a diaphanous and hard glass: but when it is in a double or triple proportion, then the glass deliquesces of itself by attracting the humidity of the atmosphere.

9. It melts easily with borax; but

10. With microscomic salt it is more difficult, and requires a longer time to melt.

11. This earth has a great analogy to acids, as it is perfectly dissolved in that wonderful natural hot-water-spout above ninety feet high at Geyser, in Iceland, where by cooling it forms a siliceous mass.

§ 1. Gems, or precious stones.

I. Diamond. *Adamas gemma*. See DIAMOND.

1. Of all stones, it is the hardest.
2. Is commonly clear, or transparent; which quality, however, may, perhaps, only belong to its crystals, but not to the rock itself from which they have their origin.

3. Its specific gravity is nearest 3,500. When brought to Europe in its rough state, it is in the form either of round pebbles with shining surfaces, or of crystals of an octoedral form.

a. Colourless, or diaphanous, or the diamond properly so called.

But it also retains this name when it is tinged somewhat red or yellow. Being rubbed, it discovers some electrical qualities, and attracts the mastic.

b. Red; Ruby. *Adamas ruber*; *Rubinus*.—Which, by lapidaries and jewellers, is, in regard to the colour, divided into,

1. The ruby of a deep red colour inclining a little to purple.

2. Spinell, of a dark colour.

3. The balass, pale red, inclining to violet. This is supposed to be the mother of the rubies.

4. The rubicell, reddish yellow.

However, all authors do not agree in the characters of these stones.

II Sapphire. *Sapphyrus gemma*.

It is transparent, of a blue colour; and is said to be in hardness next to the ruby, or diamond.

III. To-

III. Topaz. *Topazius gemma.*

- a. The pale yellow topaz; which is nearly uncoloured.
- b. The yellow topaz.
- c. Deep yellow, or gold coloured topaz, or oriental topaz.
- d. Orange-coloured topaz.
- e. The yellowish green topaz, or *chrysolite*.
- f. The yellowish green, and cloudy topaz, the *chrysoptase* (A).
- g. Bluish green topaz, or the beryl.

This varies in its colours; and is called, when

1. Of a sea-green colour, the *aqua-marine*.
2. When more green, the *beryl*.

IV. Emerald. *Smaragdus gemma.*

Its chief colour is green and transparent. It is the softest of precious stones, and when heated it is phosphorescent like the fluors.

- V. To the precious stones belong also the jacinths, or hyacinths; which are crystals harder than quartz crystals, transparent, of a fine reddish-yellow colour when in their full lustre, and formed in prisms pointed at both ends: these points are always regular, in regard to the number of the facets, being four on each point; but the fa-

cets seldom tally: the sides also which form the main body, or column, are very uncertain in regard both to their number and shape; for they are found of four, five, six, seven, and sometimes of eight, sides: further, the column or prism is in some also so compressed, as almost to resemble the face of a spherical faceted garnet.

Mr Cronstedt says, he got some jacinths of a quadrangular figure, which did not melt in the fire, but only became colourless.

- VI. The amethyst is a gem of a violet colour, with great brilliancy, and as hard as the best kind of rubies or sapphires, from which it only differs by its colour. This is called the *oriental amethyst*; and is very rare: when it inclines to the purple, or rosy colour, it is more esteemed than when it is nearer to the blue.

These amethysts have the same figure, hardness, specific gravity, and other qualities, as the best sapphires or rubies; and come from the same places, particularly from Persia, Arabia, Armenia, and the West Indies.

The amethysts called *occidental*, are of the same nature as rock crystals, and have the same gradations. viz. of a violet inclining to the purple

(A) In the *Annals of Chemistry*, Vol. I. we have the following account of the method of digging for the chrysoptasus, and of the earths and stones with which it is accompanied.

This precious stone is found in certain mountains in Silesia, which seem to begin those of Tradas, extending to within half a league of Glatz. These mountains appear, in general, to consist of a number of strata, horizontal or inclined, composed chiefly of substances containing magnesia, but likewise mixed with calcareous, argillaceous, and siliceous earths. The greatest part of these consist of serpentine, mixed with asbestos and anianthus, grey argillaceous earths, boles, and red or green ochres, stone marrow, steatites, or soap-stone, and talc. In those mountains also we meet with quartz, petrosilex, opal, and chalcedony, in detached fragments, and sometimes in continued veins. We also discover in them veins of sand, of the nature of granite. Sometimes the serpentine is met with at the surface; sometimes at the depth of 20 or 30 feet. The stone marrow seems here to be produced by the decomposition of a very milky species of opal agate named *cacholong*; for at the depth of 50 feet and upwards the veins of this soapy earth assume a degree of solidity, and we find nothing but hard and semitransparent cacholongs.

The above-mentioned strata are crossed by a great number of cracks filled with green-coloured earths and stones; but these frequently do not contain a single true chrysoptasus. They are sometimes found immediately under the vegetable mould, or at the depth of some feet, in shapeless masses, covered with a heavy clay, and sometimes enveloped by an unctuous earth of a beautiful green colour, which it derives from the calx of nickel. In other places, the chrysoptasus has been found in uneven laminæ of several yards in length and breadth, either immediately under the mould, or in the upper strata of serpentine, which have little solidity; and very beautiful ones have been found at the depth of seven or eight fathoms; and some have been met with in grey clay at the depth of four fathoms. In some places also they are met with in a kind of red ochre, which is attracted by the magnet; in others they are found in the clefts of rocks. The beautiful green chrysoptasus is found most plentifully in the mountain of Glassendorf. In another mountain named Kosmutz, where it is also found, the pieces are so porous, and so much spotted with white, &c. that sometimes upwards of 1000 of them have not afforded one large enough for the use of the jewellers. The defects are frequently only discoverable on polishing, as the green opal, while rough, perfectly resembles the chrysoptasus; but, on polishing the stones in which it is contained, it is detected by its want of lustre.

The quantity in which these stones are found is not sufficient to afford the expences of regular mining; the most profitable way, therefore, of obtaining them is by making trenches in the earth from four to six feet deep. Almost all the mountain of Kosmutz, however, has already been examined in this manner; so that they now dig for the chrysoptasus in quarries by uncovering a bank of earth or stone, and descending to other banks by steps in the open air, so as to throw the rubbish back from bank to bank. This method, however, cannot be continued farther than 24 or 30 feet, otherwise the produce would not defray the expence. The only tools employed in digging for the chrysoptasus are a spade and pick-ax; the former to remove the earth, the latter to detach the chrysoptasus itself from the stones which surround it.

Various accounts have been given of the component parts of this precious stone. Lehmann thinks, that the

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purple or rosy colour, or inclining to the blue; very often they are semi-transparent, without any colour in one end, and violet towards the other. The best are found in the Vic mountains of Catalonia in Spain, and at Wiesenthal in Saxony, as well as in Bohemia in Germany, in Italy, and in the province of Auvergne in France.

Crystals within the geodes, or hollow agathe-balls, are very often found of an amethyst colour, and some are very fine.

What we call *amethyst root*, or *mother of amethyst*, is but a sparry fluor, of which we have plenty in Derbyshire: many fine ornamental pieces are made of this substance in different forms and shapes. These spars are found in insulated masses, sometimes pretty large; but never in the form of large rocks.

VII. The garnet, (*Granatus*.) This stone, when transparent and of a fine colour, is reckoned

among the gems: but it varies more than any, both in the form of its crystals and in its colour, some being of a deep and dark red, some yellowish and purplish, and some brown, blackish, and quite opaque. In general, their lustre is less than that of other gems, as well as their hardness, which yields to the file, although they may strike fire with steel. But as to their form, these crystals take almost all sorts of figures, as the rhomboidal, tetradecaedral, &c. and some are of an irregular form.

Their colour proceeds from the iron which enters into their composition; and, according to M. de Saussure, even the finest oriental garnets attract the magnetic needle at a small distance.

The Syrian garnet is the finest and best esteemed. It is of a fine red, inclining to the purple colour, very diaphanous, but less brilliant than the oriental amethyst. It seems to be the *amethystizans* of Pliny: the Italians call it *rubino di rocca*,

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the colour of it is owing to some ferruginous particles modified in a particular manner: but the experiments he adduces for this opinion are not satisfactory. Mr Sage attributes the colour to cobalt from the blue colour it imparts to glass. Mr Achard thinks the stone contains calx of copper as well as calx of iron; because a part of the metal separable from it may be dissolved in volatile alkali. The following are the experiments of M. Klaproth upon the subject.

1. On heating several pieces of very pure chrysoprasus red hot, and quenching them in water, the colour was changed from green to bluish grey; and, on repeating the operation, it became a white grey. They were found to have lost in weight one and an half per cent. and were easily pulverable in a glass mortar.

2. Three hundred grains of chrysoprasus were mixed with double its weight of mild mineral alkali, and the mixture heated for some hours red hot, in a porcelain crucible. The mass was then powdered, and digested in distilled water. By filtration, a yellowish grey residuum was obtained, weighing 44 grains; the filtered liquor was limpid and colourless, a copious precipitate being formed with muriatic acid, which being washed and dried was found to be siliceous earth.

3. The 44 grains of yellowish grey residuum were digested in a retort, with 352 grains of aqua regia; a great part of which was evaporated. The acid which came over was returned into the retort, and filtered after a second digestion. The residuum was a very fine white siliceous earth, which, after being washed, dried, and heated red hot, weighed 20 grains.

4. The filtrated solution was of a pale green, but on supersaturation with volatile alkali immediately turned of a bluish colour, precipitating a small quantity of brownish gelatinous matter; which, when collected, twice distilled with nitrous acid, and afterwards strongly heated, yielded a brown calx of iron, weighing no more than a quarter of a grain: whence our author concludes, that iron does not contribute to the colour of the chrysoprasus, as we know many colourless stones which contain as great a quantity of that metal. This small quantity of calx was left after digesting the gelatinous residuum. On precipitating the soluble parts, they appeared to consist of aluminous earth, in an excessively divided state; which being washed and dried, weighed half a grain.

5. To find whether the solution contained calcareous earth or not, he mixed with that, supersaturated with volatile alkali, a saturated solution of mild mineral alkali, which precipitated four grains and an half of white and very pure calcareous earth.

6. Nothing more was precipitated from the solution, either by acids or alkalies, after the separation of the calcareous earth, though it still retained a bluish colour. It was poured into a retort, and evaporated to dryness; the residuum was of a yellowish colour, which became green on being dissolved in distilled water. Mild mineral alkali threw down only a little earth of a greenish white colour; which being re-dissolved in dephlogisticated nitrous acid, and precipitated with Prussian alkali, the liquor yielded 17 grains of a sea-green powder. This precipitate, in our author's opinion, is the colouring principle of the chrysoprasus; and this principle he afterwards found to be calx of nickel.

7. Our author likewise attempted to analyse the chrysoprasus in the moist way by concentrated vitriolic acid; in which process his chief view was to discover whether or not the stone contained any volatile particles or not. On an ounce of crude chrysoprasus, therefore, when put into a retort, he poured an equal quantity of rectified vitriolic acid, and two parts of distilled water. After the latter had passed over into the receiver, the fire was increased to force over the superabundant acid; a part arose in white vapours, and some fell into the receiver with an hissing noise. Boiling water, which had been distilled, was then poured upon the residuum, and the solution filtered. The powdered chrysoprasus left on the filter had not been perfectly dissolved, and,

in

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rocca, and is found in Syria, Calcutta, Cananor, Camboya, and Ethiopia.

The fine garnet of a red inclining to a yellow colour, is the *foranus* of the ancients, the *vermeille* of the French, and the *giacinto guarnacino* of the Italians. Its name is taken from *Sorian*, or *Surian*, a capital town of Pegu, from whence these gems are brought: when they have a brownish taint, they are then called *hyacinths*.

The occidental garnet is of a deep and dark red, and its hardness is lesser. However, some very fine hard garnets are found in Bohemia.—Garnets are also found in Hungary, at Pyrna in Silesia, at S. Sapho in the canton of Berne, in Spain, and in Norway.

The garnet melts in the focus of a good burning glass into a brown mass, which is attracted by the loadstone; and this shows that iron enters considerably into its composition.

Some garnets are found, which contain a little gold. Those called *zingraupen* by the Germans contain tin.

VIII. Tourmalin; *Lapis electricus*.

This is a kind of hard stone, lately brought

into notice by its electrical properties. See Siliceous EARTHS, Gems.

1. Its form is a prism of nine sides of different breadths, mostly truncated, and seldom terminating in a pyramid at each end, which is either composed of three pentagons, or of nine triangles.
2. When heated in the fire, it gives signs of contrary electricity on the two opposite ends of their prismatic form. But many of these stones are not in the least electric. However, on being rubbed, they become electric in their sides, like other diaphanous gems.
3. It is as hard almost as the topaz, and strikes fire with steel.
4. It melts by itself in a strong fire, though with difficulty.
5. With the microcosmic salt it melts perfectly; but only in part with borax.
6. With mineral alkali it is divided into a kind of powder.
7. The three mineral acids dissolve it when first reduced to a powder.
8. It bears a greater similarity to schoerl than to any other stone: but its component parts show

in general, had undergone but little alteration, so that he could not by this method determine the component parts. M. Achard, however, was more successful, and by a similar method determined the component parts of this gem to be five grains of an earth, which, distilled with vitriolic acid, became volatile; eight grains of calcareous earth, six grains of magnesia, two grains of calx of iron, three grains of calx of copper, and 456 of siliceous earth.

M. Klaproth never met with any volatile earth or magnesia in his experiments on this gem; and therefore concludes, that the chrysoprasus used by him had been essentially different from that made use of by M. Achard; and he seems not to give credit to the account of any copper being found in it.

8. One part of crude chrysoprasus, well powdered and washed with two parts of mild vegetable alkali, yielded a violet-coloured glass, which in the atmosphere ran into a brownish-coloured liquor.

9. Five parts of the gem, with four of mild alkali, gave a beautiful violet-coloured glass after being two hours in fusion.

10. Equal parts of crude chrysoprasus and mild mineral alkali, yielded a transparent glass in thin laminae, of a brown colour, resembling that of the tourmalin, the surface being marked with fine reticulated veins; which veins arose from small grains of very fine reduced nickel placed in lines against one another.

11. Equal parts of crude chrysoprasus and calcined borax, gave a clear, transparent, and brown glass, resembling the smoky topaz.

12. Equal parts of chrysoprasus, extracted by vitriolic acid and calcined borax, yielded a similar glass of a clear brown colour; "which proves (says our author), that the vitriolic acid was incapable of perfectly analysing the chrysoprasus, though I had used a double portion of the earth."

13. Eighty grains of prepared siliceous earth, sixty grains of mild fixed alkali, with three grains of calx of nickel procured from the chrysoprasus, yielded a beautiful, clear, and violet-coloured glass.

14. On substituting three grains of calx produced from an ore of nickel, a glass was produced exactly like the former.

15. Sixty grains of prepared siliceous earth and calcined borax, with three grains of calx of nickel from the chrysoprasus, yielded a transparent glass of a clear brown colour.

16. Sixty grains of prepared siliceous earth and vitrified phosphoric acid, with three grains of calx of nickel from the chrysoprasus, gave a glass of the colour of honey.

17. Thus the attempts of M. Klaproth to recompose the chrysoprasus proved abortive. From his experiments, however, he deduces the following conclusions: 1. The blue colour observable in the glass produced by fusing the chrysoprasus with vegetable alkali, arises entirely from the nickel contained in the gem; and the experiment shows that the calx of nickel, when purified as much as possible, has the surprising property of tinging glass frits prepared with vegetable alkali of a blue colour. "But (says he) why was not this colour also obtained with soda? and what is the cause of a difference so little to be expected?" 2. By these experiments the supposition of M. Sage is refuted, that the metallic matter which colours the chrysoprasus is cobalt: "many metallic substances besides cobalt, it is well known, give by certain processes a blue glass; thus

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show that it may be ranged with propriety in this place, along with other precious stones: as the argillaceous earth is also the most prevalent in its composition.

a. The oriental tourmalines are found in the island of Ceylon. They are transparent, of a dark brown yellow; and their specific gravity is from 3062 to 3295.

b. From Brasil. Transparent. These are green for the most part; but there are also some red, blue, and yellow: their specific gravity is from 3075 to 3180.

c. From Tyrol. Of so dark a green as to appear opaque. Their specific gravity is about 3050. These are found in beds of steatites and lapis ollaris, among the micaceous veins, talcs, and hornblende of Schneeberg, Jurzagl, and Zillerthal, in the mountains of Tyrol.

d. From the mountains of Old Castile in Spain. These are transparent, and have the same properties as the preceding ones.

IX. The opal, *Opalus*; the *girasole* of the Italians.—This is the most beautiful of all the flint kind, owing to the changeable appearance of its colours by reflection and refraction, and must therefore be described under both these circumstances.

1. The opal of Nonnius, the *Sangenon* of the Indians. This appears olive-coloured by reflection, and seems then to be opaque; but when held against the light, is found transparent and of a fine ruby red colour.

There is, however, another of the same kind in Sweden, which by reflection appears rather brown; but by refraction it is red, with violet veins.

2. The white opal. Its ground is white, of a glass-like complexion, from whence are thrown out green, yellow, purple, and bluish rays; but it is of a reddish or rather flame-colour when held against the light.

a. Of many colours; the oriental opal.

b. Of a milky colour.

c. Bluish, and semi-transparent. This is not

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so much valued as those which are more opaque, because it is easier to be imitated by art.

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§ 2. Of Quartz.

This stone is very common in Europe, and easier to be known than described. It is distinguished from the other kinds of the siliceous order by the following qualities.

1. That it is most generally cracked throughout, even in the rock itself; whereby,
2. As well as by its nature, it breaks irregularly, and into sharp fragments.
3. That it cannot easily be made red-hot without cracking still more.
4. It never decays in the air.
5. Melted with pot-ashes, it gives a more solid and fixed glass than any other of the siliceous order.
6. When there has been no interruption in its natural accretion, its substance always crystallises into hexagonal prisms pointed at one or both ends.
7. It occurs in clefts, fissures, and small veins in rocks. It very seldom forms large veins, and still seldomer whole mountains, without being mixed with heterogeneous substances.

According to Mr Kirwan, quartz neither loses its hardness nor its weight by calcination. Its texture is lamellar. These stones are in general the purest of the siliceous kind, though most contain a slight mixture of other earths; the most obvious distinction among them arises from their transparency or opacity.

Quartz is found,

(1.) Pure.

A. Solid, of no visible particles, with a glossy surface. Fat quartz.

a. Uncoloured and clear. This has no crystallised form, but is nevertheless as clear as quartz crystals of the best water.

b. White, the common fat quartz.

L

c. Blue

cobalt gives a blue colour to combinations of the mineral alkali with phosphoric acid, to mineral alkali itself, to potash, and to borax. The acid of tungsten (falsely so called) also gives a blue colour to frits made with phosphoric salts, but not to those made with borax; the calx of nickel gives a blue colour only to frits made with potash, brown to those with mineral alkali and borax, and yellow, like honey, to combinations of phosphoric acid with mineral alkali." 3. As the chrysoprasus gives a brown colour with borax, and the solution of this stone in muriatic acid gives no signs of cobalt dissolved in the same acid; this shows that there is no cobalt in the stone. Mr Sage, indeed, pretends, that he has obtained a blue glass from the chrysoprasus and borax; but this is contradicted by experience. 4. The mineralogical character of the chrysoprasus, therefore, is a quartz coloured green by nickel. Three hundred grains of it contain $288\frac{1}{2}$ of siliceous earth calcined to redness, one quarter of a grain of pure aluminous earth, two grains and an half of calcareous earth calcined to redness, three grains of calx of nickel, and one quarter of a grain of calx of iron. All these were extracted in the experiments; and there were besides five grains and an half of waste.

Our author mentions, that in the collections of chrysoprasus which have been brought to him, he has constantly observed green opal, in bits of vein from half an inch to an inch, and fixed in its borders: the reddish, yellow, and white opals, on the contrary, are generally met with on a green or brownish petrosilex. But the white opal, which, as well as the green, is found in pieces of the nature of matrix, differs from the true opal, approaching the chalcedony and the opaque milky quartzes. This kind of transparent opal, radiated with a whitish blue, contains the following ingredients in its composition: Siliceous earth, 237 grains; aluminous earth, a quarter of a grain; calx of iron, a quarter of a grain—in all, $237\frac{1}{4}$ grains. In 240 grains were two and an half of waste. The colour of this stone, as well as the chrysoprasus, in our author's opinion, is derived from nickel.

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- c. Blue.
d. Violet.
B. Grained.
a. White. b. Pale green.

C. Sparry quartz.

This is the scarcest; and ought not to be confounded with the white felt-spat, being of a smoother appearance, and breaking into larger and more irregular planes.

- a. Whitish yellow. b. White.

D. Crystallised quartz. Rock crystal. Quartz crystal.

1. Opaque, or semi-transparent.

- a. White, or of a milk colour.
b. Red, or of a carnelian colour.
c. Black.

2. Clear.

- a. Blackish brown, smoky topaz, or *rauch topaz* of the Germans.
b. Yellow; found in Bohemia, and sold instead of topazes.
c. Violet; the amethyst from Saxony, Bohemia, and Dammemore in Upland (B.)
d. Uncoloured; rock crystal, properly so called. When these coloured crystals are not clear, they are called *flufs*; for instance, *topaz-flufs*, *amethyst-flufs*, &c. (c.)

(2.) Impure quartz.

- A. Mixed with iron, in form of a black calx.— This is of a glossy texture, and contains a great quantity of iron.
B. Mixed with copper in form of a red calx.
a. Red.

§ 3. Of Flints.

THE flint (*Silex pyromachus*, *Lapis corneus*, or the

hornstein of the Germans) forms a kind of intermediate substance between quartz and jasper; both which, however, it so nearly resembles, that it is not easy to point out such characters as shall readily distinguish it from them. We can only, therefore, speak of its properties comparatively.

1. It is more uniformly solid, and not so much cracked in the mass as the quartz; and,
2. It is more pellucid than the jasper.
3. It bears being exposed to the air without decaying better than the jasper, but not so well as the quartz.
4. It is better for making of glass than the jasper, but is not quite so good as quartz for that purpose.
5. Whenever there has been an opportunity in this matter of its shooting into crystals, quartz crystals are always found in it; just as if the quartz made one of its constituent parts, and had in certain circumstances been squeezed out of it: this is to be seen in every hollow flint, and its clefts, which are always filled up with quartz.
6. It often shows most evident marks of having been originally in a soft and slimy tough state like glue or jelly.

The several varieties of this species have obtained more distinct names with respect to their colours than from any real difference in their substance; but these are still necessary to be retained, as the only names used by jewellers and others, who know how to value them accordingly.

I. Jade. *Lapis nephriticus*. *Jaspachates*.

The true lapis nephriticus seems to belong to this siliceous order, as it gives fire with steel, and is semi-pellucid like flint; it does not harden.

(B) The most transparent are called *false diamonds*, *Bristol*, *Kerry stones*, and *Alençon diamonds*, &c. The coloured transparent crystals derive their tinge generally from metallic calces, though in exceeding small portions: they all lose their colours when strongly heated. These are what we call false gems, viz.

The red, from Oran in Barbary, *false rubies*.

The yellow, from Saxony, *false topazes*.

The green, from Dauphiny, (very rare) *false emeralds*, or *prases*.

The violet, from Vil in Catalonia, *false amethysts*.

The blue, from Puy in Valay, France, *false sapphires*.

There are also *opal*, or *rainbow crystals*, some of which make a very fine appearance; the various colours of which are thrown out in zones across the surface, though they never shine like the oriental opal.

(c) M. Fourcroy makes a remarkable difference between the crystals and the quartz, by affirming that the former are unalterable in the fire, in which they neither lose their hardness, transparency, nor colour; whilst the quartz loses the same qualities, and is reduced by it to a white and opaque earth. He classes the rock crystals,

1st, According to their *form*, viz. 1. Insulated-hexagonal-crystals, ending in two pyramids of six faces, which have a double refraction, or show two images of the same object when looked through. 2. Hexagonal crystals united, having one or two points. 3. Tetradral, dodecadral, flated crystals; and which, though hexagonal, have nevertheless their planes irregular. 4. Crystals in large masses, from the island of Madagascar, which have a simple refraction.

2dly, As to the colour, they are either diaphanous, reddish, smokey, or blackish.

3dly, As to accidental changes, some are *hollow*: some contain *water* within one or more cavities: some are cased, viz. one within the other: some are of a round form, as the pebbles of the Rhine: some have a crust of metallic calces, or of a pyrites: some are of a geodical form, viz. crystallised in the inside of a cavity: some seem to contain amianthe, or asbestus, and others contain shirls.

The same author reckons among crystals, the oriental topaz, the hyacinth, the oriental sapphire, and the amethyst. Mr Daubenton has always looked on this last as a quartzous crystal.

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den in fire, but melts by the solar heat in the focus of a burning lens into a transparent green glass with some bubbles. That called by the name of *circoncision stone*, which comes from the Amazon river, melts easier, in the same solar fire, into a brown opaque glass, which is far less hard than the stone itself. (*Macquer.*)

This stone is superior in hardness to quartz, though from its unctuousity to the touch, one would suspect it to contain a large portion of argillaceous earth, or rather of magnesian earth, as Mr Kirwan seems to suspect.

Its specific gravity is from 2,970 to 3,389.—

It is of a granular texture, of a greasy look, and exceedingly hard: is scarcely soluble in acids, at least without particular management, and is infusible in the fire. M. Saussure seems to have extracted iron from it.

a. It is sometimes of a whitish milky colour, from China; but mostly

b. Of a greenish, or

c. Deep-green colour, from America.

d. Grey, yellowish, and olive colour: these are the vulgar *lapis nephriticus*, they being supposed to cure the nephritic pains by their external application to the loins.

The semi-pellucidity, hardness, and specific gravity, are the characters by which the *lapis nephriticus* may be distinguished from other stones.

II. Cat's eye; *Pseudopalus*. The sun-stone of the Turks, called *guncehe*.

This stone is opaque, and reflects green and yellowish rays from its surface: it is found in Siberia. It is very hard and semi-transparent, and has different points, from which light is reflected with a kind of yellow-brown radiation, somewhat similar to the eyes of cats, from whence it had its name. Jewellers do not fail to cut them round to the greatest advantage. The best of these stones are very scarce. One of these of one inch diameter was in the cabinet of the grand duke of Tuscany.

III. *Hydrophanes*, or *Oculus Mundi*; also called *Lapis mutabilis*.

The principal property which distinguishes this from all other stones, is that it becomes transparent by mere infusion in any aqueous fluid; but it gradually resumes its opacity when dry.

IV. The onyx. *Onyx camebaja*. Memphites. It is found of two sorts.

a. Nail-coloured onyx, having pale flesh-coloured and white lines.

b. With black and white lines. The oriental onyx.

V. The chalcedony, or white agate, is a flint of a white colour, like milk diluted with water, more or less

opaque: it has veins, circles, and round spots. It is said to be softer than the onyx, but much harder than those agates which are sometimes found of the same colour.

a. The white opaque chalcedony, or *cabolong*, from the Buckharish Calmucks. This was first made known by one Renez, a Swedish officer, who for several years had been in that country. The inhabitants find this flint on the banks of their rivers, and work idols and domestic vessels out of it.

b. Of white and semi-transparent strata; from Ceylon.

c. Bluish grey; from Ceylon and Siberia.

VI. The carnelian. *Carniolus*.

Is of a brownish red colour, and often entirely brown. Its name is originally derived from its resemblance to flesh, or to water mixed with blood.

a. Red.

b. Yellowish brown, looks like yellow amber. It is said not to be so hard as the chalcedony.

VII. The sardonyx.

This is a mixture of the chalcedony and carnelian, sometimes stratumwise, and sometimes confusedly blended and mixed together.

a. Striped with white and red strata: this serves as well cut in cameo as the onyx.

b. White, with red dendritical figures. This very much resembles that agate which is called the *mocha stone*; but with this difference, that the figures are of a red colour in this, instead of black, as in that agate.

Between the onyx, carnelian, chalcedony, sardonyx, and agate, there seems to be no real difference, except some inexplicable degrees of hardness.

VIII. The agate; *Achates*.

This name is given to flints that are variegated with different colours, promiscuously blended together; and they are esteemed in proportion to their mixture of colours, their beauty, and elegance. Hence also they have obtained variety of names, mostly Greek, as if the business of the lapidary in cutting of them, and admiring their several beauties and figures, had been derived from that nation alone (D).

a. Brown opaque agate, with black veins, and dendritical figures; the Egyptian pebble.

b. Of a chalcedony colour; *achates chalcedonifans*.

c. Semi-transparent, with lines of a blackish brown colour, and dendritical figures; the *mocha stone*.

d. Semi-transparent, with red dots; *Gemma divi Stephani*. When the points are very minute, so as to give the stone a red appearance, it is by some called *Sardea*.

L 2

e. Semi-

(D) On the side of a hill near the church of Rothes in Moray, is a quantity of fine agate of elegant red and white colours. It is very hard, heavy, of a smooth uniform texture, and of a considerable brightness; in which the red are remarkably clear, and finely mixed and shaded through the stone. Mr Williams says that this is the largest and most beautiful agate rock he ever saw; and so fine and hard as to be capable of the highest lustre in polishing.

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- e. Semi-transparent, with clouds of an orange colour.
- f. Deep red or violet, and semi-transparent.
- g. Of many colours, or variegated.
- h. Black.

IX. Common Flint; *Pyromachus*.

This, in reality, is of the same substance as the agate; but as the colours are not so striking or agreeable, it is commonly considered as a different substance.

- a. Blackish grey, from the province of Skone.
- b. Yellow semi-transparent, from France.
- c. Whitish grey.
- d. Yellowish brown.

When the flints are small, they are in England called *pebbles*; and the Swedish sailors, who take them as ballast, call them *singel*.

X. Chert; *Petrofiliex*, *Lapis Corneus*. The *hornstein* of the Germans.

This is of a coarser texture than the preceding, and also less hard, which makes it consequently not so capable of a polish. It is semi-transparent at the edges, or when it is broke into very thin pieces.

- a. Chert of a flesh colour, from Carl-Schakt, at the silver-mine of Salberg, in the province of Westmanland.
- b. Whitish yellow, from Salberg.
- c. White, from Kristiersberg, at Nya Kopparberget in Westmanland.
- d. Greenish, from Prestgrufvan, at Hellefors in Westmanland.

Chert runs in veins through rocks, from whence its name is derived. Its specific gravity is from 2590 to 2700. In the fire, it whitens and decrepitates like flint, but is generally so fusible as to melt *per se*. It is not totally dissolved in the dry way by the mineral alkali; but borax and microcosmic salt dissolve it without effervescence. Its appearance is duller and less transparent than common flint. The reddish Petro-filiex used in the Count de Lauragar's porcelain manufacture, and called there *felt spat*, contained 72 per cent. of flint, 22 of argill, and 6 of calcareous earth.

There are not yet any certain characters known by which the cherts and jaspers may be distinguished from each other: by sight, however, they can easily be discerned, viz. the former (the cherts) appearing transparent, and of a fine sparkling texture, on being broken; whereas the jasper is grained, dull, and opaque, having the appearance of a dry clay. The chert is also found forming larger or smaller veins, or in nodules like kernels in the rocks; whereas the jasper, on the contrary, sometimes constitutes the chief substance of the highest and most extended chain of mountains. The chert is likewise found plentifully in the neighbourhood of scaly limestone, as flints in the strata of chalk. What connection there may be between these bodies, perhaps time will discover.

But flints and agates being generally found in

loose and single irregular nodules, and hardly in rocks, as the chert, it is a circumstance very insufficient to establish a difference between them; for there is the agate-stone, near Constantinople, running vein-like across the rock with its country of the same hardness, and as fine and transparent as those other agates which are found in round nodules at Deux-ponts. We must, therefore, content ourselves with this remark concerning flints, viz. That they seem to be the only kind of stone hitherto known, of which a very large quantity has been formed in the shape of loose or separate nodules, each surrounded with its proper crust; and that the matter which constitutes this crust has been separated from the rest of the substance, in like manner as sandiver or glass-gall separates from, and swims upon, glass, during its vitrification; though sometimes the formation of this crust may be prevented by the too sudden hardening of the matter itself.

Other species of stones, which are found in loose pieces or nodules, except ores and some sorts of stalactites, show evidently by their cracks, angles, and irregular figures, that they have been torn from rocks, rolled about, and rubbed against one another in torrents, or by some other violent motions of water.

That flints had originally been in a soft state, M. Cronstedt observes, is easy to be seen in the Egyptian pebbles, which have impressions of small stones, sand, and sometimes, perhaps, grass; which, however, have not had any ingress into the very flint, but seem only to have forced the above agate-gall or crust out of the way.

§ 4. Of Jaspers.

JASPER, *jaspis*, (the *diaspro* of the Italians), is a name given to all the opaque flints whose texture resembles dry clay, and which have no other known quality whereby they may be distinguished from other flints, except that they may be more easily melted in the fire; and this quality perhaps may proceed from the heterogeneous mixture, probably of iron.

I. Pure jasper; which by no means yet known can be decomposed.

- a. Green with red specks or dots; the *heliotrope*, or blood-stone. b. Green. c. Red. d. Yellow. e. Red with yellow spots and veins. f. Black.

II. Jasper containing iron; *Jaspis martialis Sinople*.

A. Coarse-grained.

a. Red and reddish brown; *sinople*.

B. Steel-grained, or fine-grained.

a. Reddish brown; looks like the red ochre or chalk used for drawing; and has partition veins, which are unctuous to the touch, like a fine clay, and other like kinds.

C. Of a solid and shining texture, like a slag.

a. Liver-coloured; and, b. Deep red. c. Yellow. This last mentioned, when calcined, is attracted by the loadstone; and being assayed, yields from 12 to 15 per cent. of iron. (E.)

§ 5.

(E) Near Portsoy in Banff-shire is an extensive rock of jasper; some parts of which contain a beautiful mixture of green and red, which appear finely shaded and clouded through the body of the stone when polished. Mr Williams is of opinion that it would be a very valuable quarry if worked.

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§ 5. Felt-spars.

1. Rhombic quartz; *Spatum scintillans*.

This has its name from its figure, but seems to be of the same substance as the jasper. We have not, however, ranked them together, for want of true marks to distinguish the different sorts of the flinty tribe from one another.

This kind is found,

1. Sparry.

a. White. b. Reddish brown. c. Pale yellow. d. Greenish.

2. Crystallised.

a. In separate or distinct rhomboidal crystals.

II. Labradore stone; *Spatum rutilum versicolor*.

Its colour is commonly of a light or of a deep grey, and mostly of a blackish grey: but when held in certain positions to the light, discovers different varieties of beautiful shining colours, as lazuly-blue, grass-green, apple-green, pea-green; and seldom a citron-yellow; some have an intermediate colour betwixt red-copper and tombac-grey; besides other colours between grey and violet. These colours are seen for most part in spots; but sometimes in stripes, on the same piece.

III. White feltspar; *Terra Silicea Magnesia & ferro intimè mixta*.

This stone has been described by Mr Bayen: and is found at St Marie aux mines in Lorrain. —It is of a white opaque colour, spotted with ochre on the outside.

§ 6. Of the Garnet Kinds.

THE substances of this genus (which is considered by Cronstedt as an order) are analogous to gems; since all these are composed of the siliceous, calcareous, and argillaceous earths, with a greater or less proportion of iron. The opaque and black garnets contain about 20 hundredths of iron: but the diaphanous ones only two hundredths of their weight, according to Bergman. The garnets, properly so called, contain a greater quantity of siliceous earth than the shirls, and both are now justly ranked with the siliceous earths.

The species are,

1. Garnet; *Granatus*.

This is a heavy and hard kind of stone, crystallising in form of polygonal balls, and mostly of a red, or reddish brown colour.

A. Garnet mixed with iron; *Granatus martialis*.

1. Coarse-grained garnet-stones, without any particular figure; in Swedish called *Granatberg*; in German, *Granatstein*.

a. Reddish-brown garnet. b. Whitish-yellow. c. Pale yellow.

2. Crystallised garnet.

a. Black. b. Red: semi-transparent, and cracked; transparent. c. Reddish-yellow; transparent; the jacinth, or hyacinth. d. Reddish brown. e. Green. f. Yellowish-green. g. Black.

B. Garnet mixed with iron and tin.

1. Coarse-grained, without any particular figure.

a. Blackish-brown.

2. Crystallised.

a. Blackish-brown.

b. Light-green or white.

C. Garnet mixed with iron and lead.

1. Crystallised.

a. Reddish-brown.

II. Cockle, or shirl. *Corneous crystallifatus Wallerii*; *Stannum crystallis columnaribus nigris Linnæi*.

This is a heavy and hard kind of stone which shoots into crystals of a prismatical figure, and whose chief colours are black or green. Its specific gravity is the same as the garnets, viz. between 3000 and 3400, though always proportionable to their different solidity.

A. Cockle, or shirl, mixed with iron.

1. Coarse, without any determined figure.

a. Green,

2. Sparry.

a. Deep green, (the mother of the emeralds), from Egypt.

b. Pale green.

c. White. This occurs very frequently in the scaly limestones; and its colour changes from deep green to white, in proportion as it contains more or less of iron.

3. Fibrous, striated cockle, or shirl: it looks like fibres or threads made of glass.

A. Of parallel fibres. a. Black. b. Green. c. White.

B. Of concentrated fibres: The starred cockle, or shirl, from its fibres being laid stellarwise.

a. Blackish green. b. Light green. c. White.

4. Crystallised cockle, or shirl.

a. Black. To this variety belong most of those substances called *imperfect asbesti*; and as the cockle perfectly resembles a slag from an iron furnace, both in regard to its metallic contents and its glassy texture, it is no wonder that it is not soft enough to be taken for an asbestus. It has, however, only for the sake of its structure, been ranked among the asbesti. The striated cockle, or shirl, compared to the asbesti, is of a shining and angular surface (though this sometimes requires the aid of the magnifying glass to be discovered), always somewhat transparent, and is pretty easily brought to a glass with the blow-pipe, without being consumed as the pure asbesti seem to be.

b. Deep green.

c. Light green.

d. Reddish brown. The *tauffstein* is of this colour, and consists of two hexagonal crystals of cockle grown together in form of a cross; this the Roman Catholics wear as an amulet, and is called in Latin *lapis crucifer*, or the cross stone.

The figure of the cockle crystals is uncertain, but always prismatical: the cockle from Yxio at Nya Kopparberg, is quadrangular: the French kind has nine sides or planes; and the *tauffstein* is hexagonal.

The name *cockle* for these substances is an old Cornish mineral name; but is also given sometimes to other very different matters.

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We have not in England any great quantity of species of cockles; the chief are found in the tin mines of Cornwall, and some fine crystallised kinds have been brought from Scotland.

The English mineral name of *call*, has been used by some authors as synonymous with *cockles*, and they are confounded together at the mines; but the *call*, definitely speaking, is the substance called *wolfram* by the Germans, &c.

Garnets, though small, are often found in micaeous stones in England; but extreme good garnets are found in great plenty also in like stones in Scotland.

III. Rowley rag, (*Kirwan*.) This stone is of a dusky or dark grey colour, with numerous minute shining crystals. Its texture is granular: by exposure to the air it acquires an ochry crust. Its specific gravity is 2748. Heated in an open fire it becomes magnetic. In strong heat it melts *per se*, but with more difficulty than basalt. According to Dr Withering's analysis, 100 parts of it contain 47,5 of siliceous earth, 32,5 of argil, and 20 of iron.

IV. Siliceous muriatic spar, (*Id.*) This stone is of a hard, solid, and sparry texture; of a grey, ochry, dull colour, but internally bright. It gives fire with steel: yet it effervesces with acids. In a strong heat it grows brown; but at last it melts *per se*. One hundred parts of this stone contain fifty parts of silex: the remainder is mild magnesia and iron; but in what proportion is not mentioned (See *Journal de Physique*, Supplement, vol. xiii. p. 216.)

V. Turkey stone; *cos Turcica*, (*Id.*) This stone is of a dull white colour, and often of an uneven colour, some parts appearing more compact than others, so that it is in some measure shattery. It is used as a whetstone: and those of the finest grain are the best hones for the most delicate cutting tools, and even for razors, lancets, &c. Its specific gravity is 2598. It gives fire with steel; yet effervesces with acids. Mr Kirwan found that 100 parts of it contains 25 of mild calcareous earth, and no iron. There probably are two sorts of stones known by this name, as Mr Wallerius affirms, that which he describes neither to give fire with steel nor effervesce with acids.

VI. Ragg stone. The colour of this stone is grey. Its texture is obscurely laminar, or rather fibrous, but the laminæ or fibres consist of a congeries of grains of a quartz appearance, coarse and rough. Its specific gravity is 2729. It effervesces with acids; and gives fire with steel. Mr Kirwan found it to contain a portion of mild calcareous earth, and a small proportion of iron. It is used as a whet-stone for coarse cutting tools.

[The siliceous grit, *cos arenarius*, and other compounds of the siliceous earth, &c. will be found in a subsequent division of this article.]

Observations on the economical Uses of the Siliceous Order.

THE Europeans have no farther trouble with the precious stones than either to cut them from their natural or rough figure, or to alter them when they have been badly cut in the East Indies; in which latter cir-

cumstances they are called *labors*; and it may be observed, that for cutting the ruby, spinell, ballas, and chrysolite, the oil of olive is required, instead of any other liquid, to be mixed with the diamond powder, in the same manner as for cutting the diamond itself.

If the petty princes in those parts of the Indies, where precious stones are found, have no other power nor riches proportionable to the value of these gems, the reason of it is as obvious as of the general weakness of those countries where gold and silver abound, viz. because the inhabitants, placing a false confidence in the high value of their possessions, neglect useful manufactures and trade, which by degrees produces a general idleness and ignorance through the whole country.

On the other hand, perhaps, some countries might safely improve their revenues by such traffic. In Saxony, for example, there might probably be other gems found besides aqua marines and topazes; or even a greater trade carried on with these than at present, without danger of bad consequences, especially under the direction of a careful and prudent government.

The *half-precious* stones, so called, or gems of less value, as the common opal, the onyx, the chalcedony, the cornelian, and the coloured and colourless rock crystals, have been employed for ornaments and economical utensils, in which the price of the workmanship greatly exceeds the intrinsic value of the stones. The ancients used to engrave concave and convex figures on them, which now-a-days are very highly valued, but often with less reason than modern performances of the same kind. These stones are worked by means of emery on plates and tools of lead, copper, and tin, or with other instruments; but the common work on agates is performed at Oberstein with grind-stones at a very cheap rate. When once such a manufactory is established in a country, it is necessary to keep it up with much industry and prudence, if we would wish it to surmount the caprice of fashions; since, howmuch-soever the natural beauties of these stones seem to plead for their pre-eminence, they will at some periods unavoidably sink in the esteem of mankind; but they will likewise often recover, and be restored to their former value.

The grindstones at Oberstein are of a red colour, and of such particular texture, that they neither become smooth, nor are they of too loose a composition.

Most part of the flinty tribe is employed for making glass, as the quartz, the flints, the pebbles, and the quartzose sands. The quartz, however, is the best; and if used in due proportion with respect to the alkali, there is no danger of the glass being easily attacked by the acids, as has sometimes happened with glass made of other substances, of which we had an instance of bottles filled with Rhenish and Moselle wines during the time of a voyage to China.

In the smelting of copper ores, quartz is used, to render the slag glassy, or to vitrify the iron; quartz being more useful than any other stone to prevent the calcination of the metal.

The quartzose sand which constitutes part of many stones, and is also used in making crucibles and such vessels,

Argillaceous EARTHS. vessels, contributes most of all to their power of resisting fire.

It appears likewise probable that the quartzose matter makes the grind and whetstone fit for their intended purposes. (*Magellan.*)

Order V. *The ARGILLACEOUS EARTHS.*

THE principal character whereby those may be distinguished from other earths is, that they harden in the fire, and are compounded of very minute particles, by which they acquire a dead or dull appearance when broken.

I. *Argilla aerata; lac luna.*

This fanciful name was heretofore thought to denote a very fine species of calcareous earth; but Mr. Screber has lately shown, that the earth to which this name is given, is a very uncommon species of argill. It is generally found in small cakes of the hardness of chalk; and like that, it marks white. Its hardness is nearly as that of steatites, and it does not feel so fat as common clay does. Its specific gravity is 1669; its colour snow white. When examined with a microscope, it is found to consist of small transparent crystals; and by his experiments it appears plainly to be an argill saturated with fixed air. It effervesces with acids, and contains a very small proportion of calcareous earth and sometimes of gypsum, besides some feeble traces of iron. It is found near Halles.

II. Porcelain clay; *Terra porcellanea*, vulgo *Argylla apyra*, very refractory; the kaolin of the Chinese.

(1.) Pure.

A Diffusible in water.

1. Coherent and dry.

a White.

2. Friable and lean.

a. White.

(2.) Mixed with phlogiston

A. Diffusible in water.

a. White and fat pipe clay. b. Of a pearl colour.

c. Bluish grey. d. Grey. e. Black. f. Violet.

These contain a phlogiston, which is discovered by exposing them to quick and strong fire, in which they become quite black interiorly, assuming the appearance of the common flints, not only in regard to colour, but also in regard to hardness: but if heated by degrees, they are first white, and afterwards of a pearl colour. The latter they seem to be, which may be judged both by their feeling smooth and unctuous, and by their shining when scraped with the nail, they contain a larger quantity of the inflammable principle. It is difficult to determine, whether this strongly inherent phlogiston be the cause of the above-mentioned pearl-colour, or prevents them from being burnt white in a strong fire; yet no heterogeneous substance can be extracted from them, except sand, which may be separated from some by means of water; but which sand does not form any of the constituent parts of the clays. If they be boiled in aqua regis in order to extract any iron, they are found to lose their viscosity.

III. Stone-marrow; *Lithomarga*. *Keffekil* of the Tartars.

1. When dry, it is as fat and slippery as soap; but,

2. Is not wholly diffusible in water, in which it only falls to pieces, either in larger bits, or resembles a curd-like mass.

3. In the fire it easily melts to a white or reddish frothy slag, consequently is of a larger volume than the clay was before being fused.

4. It breaks into irregular scaly pieces.

A. Of coarse particles: Coarse stone-marrow.

a. Grey.

b. Whitish yellow, from the Crim Tartary, where it is called *keffekil*, and is said to be used for washing instead of soap.

B. Of very fine particles; fine stone-marrow.

a. Yellowish brown; *Terra Lemnia*.—Is of a shining texture, falls to pieces in the water with a crackling noise; it is more indurated than the preceding, but has otherwise the same qualities.

IV. Bole, (iron clay.)

This is a fine and dense clay of various colours, containing a great quantity of iron, which makes it impossible to know the natural and specific qualities of the bole itself, by any easy method hitherto in use. It is not easily softened in water, contrary to what the porcelain and the common clays are, (I. & VI.); but either falls to pieces in form of small grains, or repels the water, and cannot be made ductile. In the fire it grows black, and is then attracted by the loadstone.

A. Loose and friable boles, or those which fall to a powder in water.

a. Flesh-coloured bole.

b. Red.

1. Fine; *Bolus Armenus*.

2. Coarse; *Bolus communis officinalis*.

3. Hard: *Terra rubrica*.

c. Green; *Terre verte*.

1. Fine.

2. Coarse.

d. Bluish-grey, is ductile as long as it is in the rock, but even then repels the water; it contains 40 per cent. of iron; which metal being melted out of it in a close vessel, the iron crystallises on its surface.

e. Grey.

1. Crystallised in a spherical polygonal figure.

2. Of an undeterminate figure.

B. Indurated bole.

a. Of no visible particles.

This occurs very often in form of slate, or layers, in the earth; and then is made use of as an iron ore. However, it has usually been considered more in regard to its texture than to its constituent parts; and has been called *slate*, in common with several other earths which are found to have the same texture.

a. Reddish-brown; in most collieries, between the seams of coal.

b. Grey.

b. Of scaly particles.—The hornblende of the Swedes.

It is distinguished from the martial glimmer, or mica, by the scales being less shining, thicker, and rectangular.

- a. Black.—This, when rubbed fine, gives a green powder.
- b. Greenish.

V. Zeolyte.

This is described in its indurated state in the Transactions of the academy of sciences at Stockholm for the year 1756, and there arranged as a stone *sui generis* in regard to the following qualities.

1. It is a little harder than the fluors and the other calcareous spars; it receives, however, scratches from the steel, but does not strike fire with it.
2. It melts easily by itself in the fire, with a like ebullition as borax does, into a white frothy slag, which cannot without great difficulty be brought to a solidity and transparency.
3. It is more easily dissolved in the fire by the mineral alkali (*sal sodæ*), than by borax or the microcosmic salt.
4. It does not ferment with this last salt, as lime does; nor with the borax, as those of the gypseous kind.
5. It dissolves very slowly, and without any effervescence, in acids, as in oil of vitriol and spirit of nitre. If concentrated oil of vitriol be poured on pounded zeolites, a heat arises, and the powder unites into a mass.
6. In the very moment of fusion it gives a phosphoric light.

There have lately been discovered some of the zeolites, particularly at Adelfors's gold mines in Smoland, in Sweden; of which some sorts do not melt by themselves in the fire, but dissolve readily in the acid of nitre, and are turned by it into a firm jelly.

The zeolyte is found in an indurated state:

- (1.) Solid, or of no visible particles.
 - A. Pure.
 - a. White.
 - B. Mixed with silver and iron.
 - a. Blue, *Lapis lazuli*.
- (2.) Sparry zeolite. This resembles a calcareous spar, though it is of a more irregular figure, and is more brittle.
 - a. Light red, or orange-coloured.
- (3.) Crystallised zeolite. This is more common than the two preceding kinds; and is found,
 - A. In groupes of crystals, in form of balls, and with concentric points.
 - a. Yellow.
 - b. White.
 - B. Prismatical and truncated crystals.
 - a. White.
 - C. Capillary crystals, which are partly united in groupes, and partly separate. In this latter accretion they resemble the capillary or feathery silver ore; and are perhaps sometimes called *flos ferri*, at places where the nature of that kind of stone is not yet fully known.
 - a. White.

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VI. Tripoli.

This is known by its quality of rubbing or wearing hard bodies, and making their surfaces to shine; the particles of the tripoli being so fine as to leave even no scratches on the surface. This effect, which is called *polishing*, may likewise be effected by other fine clays when they have been burnt a little. The tripoli grows somewhat harder in the fire, and is very refractory: it is with difficulty dissolved by borax, and still with greater difficulty by the microcosmic salt. It becomes white when it is heated: when crude, it imbibes water, but is not diffusible in it: it tastes like common chalk, and is rough or sandy between the teeth, although no sand can by any means be separated from it. It has no quality common with any other kind of earth, by which it might be considered as a variety of any other. That which is here described is of a yellow colour, and is sold by druggists. This kind of tripoli has been lately discovered in Scotland. But the *rotten-stone*, so called, is another sort found in England, viz. in Derbyshire. It is in common use in England among workmen for all sorts of finer grinding and polishing, and is also sometimes used by lapidaries for cutting of stones, &c.

The tripoli is found,

1. Solid: of a rough texture.
 - a. Brown.
 - b. Yellowish.
 - c. Spotted like marble.
2. Friable and compact.
 - a. Granulated.
 - b. Brown.
 - c. Yellowish.

VII. Common clay, or brick clay.

This kind may be distinguished from the other clays by the following qualities:

1. In the fire it acquires a red colour, more or less deep.
2. It melts pretty easily into a greenish glass.
3. It contains a small quantity of iron and of the vitriolic acid, by which the preceding effects are produced.

It is found,

- A. Diffusible in water.
 1. Pure.
 - a. Red clay.
 - b. Flesh-coloured, or pale-red.
 - c. Grey.
 - d. Blue.
 - e. White.
 - f. Fermenting clay.
 2. Mixed with lime. See MARLE, above.
- B. Indurated.
 1. Pure.
 - a. Grey slaty.
 - b. Red slaty.
 2. Mixed with phlogiston, and a great deal of the vitriolic acid. See ALUM Ores, above.
 3. Mixed with lime. See LIME, above.

VIII. Argillaceous fissile stones.

These and many other different kinds of earth have been comprehended under the denomination

of *schist*; but to avoid ambiguity we will confine this name to stones of the argillaceous kind.

1. The bluish purple schistus, or common roof slate; *schistus tegularis*.

Its colour varies to the pale, to the slightly purple, and to the bluish.

a. The dark-blue slate, *schistus scriptorius*.

2. The pyritaceous schistus.

This is of a grey colour, brown, blue, or black.

3. The bituminous schistus.

This is generally black, of a lamellar texture, and of different degrees of hardness.

4. Flag stone.

This is of a grey, yellowish, or reddish white colour.

5. The argillaceous grit.

This is called also *sand stone* and *free stone*, because it may be cut easily in all directions.

6. Killas.

This stone is of a pale grey or greenish colour; either lamellar, or coarsely granular. It is found chiefly in Cornwall.

7. Toadstone.

Dr Withering, who has given an analysis of this stone, describes it as being of a dark brownish grey colour, of a granular texture, not giving fire with steel, nor effervescing with acids. It has cavities filled with crystallised spar, and is fusible *per se* in a strong heat. It is found in Derbyshire. See TOADSTONE.

For the economical uses of the argillaceous earths, see the article CLAY.

[The compounds of this and other earths will fall to be mentioned under a subsequent division.]

CLASS II. SALTS.

By this name those mineral bodies are called which can be dissolved in water, and give it a taste; and which have the power, at least when they are mixed with one another, to form new bodies of a solid and angular shape, when the water in which they are dissolved is diminished to a less quantity than is required to keep them in solution; which quality is called *crystallisation*.

In regard to the principal known circumstances or qualities of the mineral salts, they are divided into

1. Acid salts, or mineral acids.

2. Alkaline salts, or mineral alkalies.

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Order I. ACID SALTS.

Acid
SALTS.

For the characters, properties, and phenomena of these, see the article ACID, and CHEMISTRY-Index.

Till of late no more mineral acids were known than the vitriolic and marine; the boracic or sedative salt being reckoned as produced artificially: but later discoveries have proved that we may reckon at least eleven mineral acids; out of which only two or three have been found in an uncombined state. Those hitherto known are the following, viz. the vitriolic, the nitrous, the marine, the sparry, the arsenical, the molybdenic, the tungstenic, the phosphoric, the boracic, the succinous, and the aerial. See the article ACID, and CHEMISTRY-Index.

I. The vitriolic acid. See CHEMISTRY-Index.

II. Nitrous acid.

This acid is by some excluded from the mineral kingdom, because they suppose it to be produced from putrefaction of organic bodies. But these bodies, when deprived of life, are again received amongst fossils, from whence their more fixed parts were originally derived. For the nature of this acid, see CHEMISTRY-Index.

III. Acid of common or sea-salt. See CHEMISTRY-Index, at Acid and Marine.

IV. The fluor acid, or sparry fluor acid. See CHEMISTRY-Index.

This acid is obtained by art, as it has never been found disengaged, but united, to calcareous earth, forming a sparry fluor*, called *Derbyshire fluor*, *Cornish fluor*, *blue John*, or *amethyst root*, *Spar* when of a purple colour. See p. 72. col. 2. concerning the substances arising from the combination of this acid with calcareous earth.

V. The acid of arsenic. See CHEMISTRY-Index.

VI. The acid of molybdena. *Ibid.*

VII. The acid of tungsten. *Ibid.*

VIII. The phosphoric acid. *Ibid.*

IX. The boracic acid. *Ibid.*

X. The succinous or amber acid. *Ibid.*

XI. Aerial acid, or fixed air. *Ibid.*

Order II. ALKALINE MINERAL SALTS.

For the characters, properties, and phenomena of these, see the article ALKALI; also CHEMISTRY-Index, at Alkali and Alkalies.

New acids are daily detected; but no additions have been made to the three species of alkali long since known.

These alkaline salts are,

I. Vegetable fixed alkali (A.)

M

Vegetable

(A) With regard to the origin of the vegetable fixed alkali, there are sufficient proofs that it exists already formed in plants, and also that a portion is formed by combustion: but in each case, the alkali is obtained in an impure state through the admixture of other matters, which must be separated before it can be used for chemical purposes.

The *cendres gravelées* are made by burning the husks of grapes and wine lees. They contain the purest alkali met with in common, and are used by the dyers.

Pot-ash is made by burning wood and other vegetables. This alkali is much phlogisticated, and contains many foreign and saline matters, which, however, may be separated.

That which is obtained from the ashes of wood burned in kitchens is the most pure of all. On the contrary,

Alkaline
SALTS.Alkaline
SALTS.

Vegetable fixed alkali, deprived of every acid, is not found any where by itself; but it is sometimes met with in combination with the vitriolic acid or the muriatic, generally with the nitrous, rarely with the aerial (B.)

The fixed vegetable alkali (or *potasse* of Morveau), is of a powdery appearance, and of a dead white colour. When pure, it is much more caustic than the neutral salt; it forms with the aerial acid, and even corrodes the skin (C.)

1. It changes the blue colours of vegetables into a deep green.
2. It has no smell when dry; but when wetted, it has a slight lixivious odour.
3. Its taste is strongly acrid, burning, caustic, and urinous (D). This last sensation arises from the volatile alkali it disengages from animal substances.
4. When exposed to the air, it attracts humidity, and is reduced into a transparent colourless liquor. According to Gellert, it attracts three times its own weight of water.
5. It likewise attracts sometimes the aerial acid from the atmosphere, and is thereby deprived of its property of deliquescing.
6. When it is dissolved in an equal weight of water, it has an oily feel, owing to its action on the fatty parts of the skin, whence it is, though improperly, called *oil of tartar*.
7. In a moderate heat it melts; but in a more violent fire, it is dispersed or volatilized.
8. It is a most powerful solvent by the dry way: in a proper heat, it dissolves calcareous, argillaceous, siliceous, and metallic earths: and when the alkali is nearly equal in quantity to the earth, it forms various kinds of hard, solid, and transparent glass.
9. But if the alkali be in quantity three or four times that of the earth, the glass is deliquescent.
10. The mild vegetable alkali unites with the vitriolic acid with a violent effervescence, and produces vitriolated tartar.

11. With the nitrous acid, it forms the crystallizable salt, called *nitre*.
12. With the marine acid it forms a kind of salt less grateful than common salt, which is called the *febrifuge salt of Sylvius*.
13. With vinegar it forms a neutral deliquescent salt of a sharp taste, called *terra foliata tartari*.
14. With cream of tartar it forms tartarized tartar.
15. It dissolves sulphur, and forms the substance called *liver of sulphur*, which is a powerful solvent of metallic substances.
16. It attracts the metals, and dissolves some of them with peculiar management. Silver, mercury, and lead, are more difficultly dissolved than gold, platina, tin, copper, and especially iron. The last gives a fine reddish saffron colour, first observed by Stahl, who called it the *martial alkaline tincture*.
17. It dissolves in the dry way all the dephlogisticated metallic calces.
18. It unites with oils and other fat substances, with which it forms soap.
19. This alkali becomes opaque when exposed to the flame of the blow-pipe: it decrepitates a long time, and forms a glassy button, which is permanent in the little spoon; but is absorbed with some noise on the charcoal when blown upon it.

II. Fossil fixed alkalis.

A. Alkali of the sea, or of common salt (E.)

1. Pure.

This has nearly the same qualities with the lixivious salt, which is prepared from the ashes of burnt vegetables. It is the same with the *sal soda*, or kelp: for the kelp is nothing else than the ashes remaining, after the burning of certain herbs that abound in common salt; but which common salt, during the burning of those vegetables, has lost its acid (F).

The properties of the fossil alkali are as follows:

1. It

trary, that which is got from tartar, properly burned, then dissolved in boiling water, and purified by filtration and crystallisation, is called *salt of water*. It is the best.

(B) The vegetable alkali is seldom found in the earth, except in wells of towns, as at Doway, or in the argillaceous alum-ore of la Tolfa: it is found also united to the nitrous acid, near the surface of the earth, in Spain and in the East-Indies, probably from the putrefaction of vegetables.

(C) Common vegetable alkali, salt of tartar, and pot-ash, were formerly considered by chemists as simple alkalis; but Dr Black has demonstrated them to be true neutral salts, arising from the combination of the vegetable alkali with the aerial acid. From hence it follows, that the above common alkalies, even after any other extraneous substance has been extracted, must be freed from this acid, by putting each in a crucible, and exposing it to a strong fire, which will dissipate this aerial acid. The alkali so purified, is to be put in a glass vial before it be entirely cold, and kept close with a proper stopple; otherwise the aerial acid which floats in large quantities on the atmosphere will combine again with the pure alkali. (*Mongez.*)

(D) The alkali must be largely diluted with water, in order to be tasted; otherwise it will act on the tongue, and corrode the parts where it touches. (*Macquer.*)

(E) This salt is not met with pure in Europe; but it is said to be found in both the Indies, not only in great quantity, but likewise of a tolerable purity: it is there collected in form of an efflorescence in the extensive deserts, a profitable trade being carried on in it for the making of soap and glass; and, therefore, it is very probable that the ancients meant this salt by their *natron* or *bourach*. (*Magellan.*)

(F) The mineral alkali is often combined with the vitriolic and marine acid, and also with the aerial acid;

1. It effervesces with acids, and unites with them.
2. Turns the syrup of violets to a green colour.
3. Precipitates sublimate mercury in an orange-coloured powder.
4. Unites with fat substances, and forms soap.
5. Dissolves the siliceous earth in the fire, and makes glass with it, &c. It distinguishes itself from the salt of the pot ashes by the following properties (G).
It shoots easily into rhomboidal crystals; which
7. Fall to powder in the air, merely by the loss of their humidity (H).
8. Mixed with the vitriolic acid, it makes the *sal mirabile Glauberi*.
9. It melts more easily, and is fitter for producing the *sal commune regeneratum*, *nitrum cubicum*, &c. Perhaps it is also more conveniently applied in the preparation of several medicines.

10. It is somewhat volatile in the fire.

III. Volatile mineral alkali.

This perfectly resembles that salt which is extracted from animals and vegetables, under the name of *alkali volatile*, or *sal urinosum*, and is commonly considered as not belonging to the mineral kingdom; but since it is discovered, not only in most part of the clays, but likewise in the sublimations at Solfatara, near Naples, it cannot possibly be quite excluded from the mineral kingdom (I).

Its principal qualities are,

- a. In the fire it rises in *forma sicca*, and volatilises in the air in form of corrosive vapours, which are offensive to the eyes and nose (K).
- b. It precipitates the solution of the mercurial sublimate in a white powder.
- c. It also precipitates gold out of aqua-regia, and detonates with it; because,
- d. It has a re-action in regard to the acids, tho' not so strongly as other alkalies.

M 2

e. It

acid; with which last it retains not only the name but many of the properties of a pure alkali, because this last acid is easily expelled.

It is easily known by its crystallisation and its solubility in two times and an half of its weight of water, at the temperature of 60 degrees.

One hundred parts of this alkali, when pure and recently crystallised, contain 20 of mere alkali, 16 of aerial acid, and 64 of water. (*Macquer*.)

Mineral alkali is found in Hungary, in marshy grounds, of an argillaceous or marly nature, either mixed with water or crystallised and efflorescing. It is found also in Egypt at the bottom of lakes, and dried up by the summer's heat; and also in the province of Suchena, 28 days journey from Tripoli, where it has the name of *Trona*; in Syria, Persia, as well as in the East-Indies, and China, where it is called *kien*. It sometimes germinates on walls, and is called by many *aphronitron*. In its native state, is frequently mixed with magnesian earth, common salt, muriatic magnesia, and marine selenite. (*Kirwan*.)

(G) This mineral alkali likewise differs from the vegetable, 1. By its taste, which is less corrosive and burning. 2. By its not deliquescing. 3. By the small degree of heat it produces if calcined, and afterwards added to water. 4. By its property of crystallising, by evaporating the water from its solution, as is practised with neutral salts; whereas the vegetable alkali does not crystallise unless combined with a large portion of aerial acid.

(H) This alkali being a very useful commodity, and essentially necessary in a number of manufactories, many ingenious processes have been contrived and attempted to procure it at a cheap rate, by decomposing the sea-salt; but it is believed, that till lately none of these new manufactures have succeeded, except that of Mr Turner, mentioned by Mr Kirwan in the second part of the Philosophical Transactions for 1782.—The process is said to consist in mixing a quantity of litharge with half its weight of common salt, which, on being triturated with water till it assumes a white colour, is left to stand some hours; after which, a decomposition ensues, the alkali being left alone, whilst the acid unites to the metallic calx; and this last being urged by a proper degree of fire, produces a fine pigment of a greenish yellow colour, whose sale pays for the most part of the expences.

Mr Kirwan says, in the place already quoted, that if common salt perfectly dry be projected on lead heated to incandescence, the common salt will be decomposed, and a horn-lead formed, according to Margraaf. He adds also, that according to Scheele, if a solution of common salt be digested with litharge, the common salt will be decomposed, and a caustic alkali produced; and, finally, that Mr Scheele decomposed common salt, by letting its solution slowly pass through a funnel filled with litharge.

(I) It is easily known by its smell, though in a mild state, by its volatility, and by its action on copper; the solutions of which, in the mineral acids, are turned blue by an addition of this alkali. It is frequently found, though in small quantities, in mould, marl, clay, schistus, and in some mineral waters. It probably derives its origin, in the mineral kingdom, from the putrefaction or combustion of animal or vegetable substances. (*Kirwan*.)

The same is caustic when uncombined with any acid, not excepting even the aerial acid. It differs from the other two alkalies in many essential particulars. 1. By its aeriform or gaseous nature. For the volatile alkali, in a state of purity, is nothing more than an alkaline gas diffused in water, as Dr Priestley has demonstrated. 2. By its volatility. 3. By the nature of the salts it forms with acids, which are very different from those whose bases are formed either of the vegetable or mineral alkali. (*Mongez*.)

(K) Pure volatile alkali, in an aerial form, resembles atmospheric air, but is more heavy. Its smell is pene-

- e. It tinges the solution of copper blue, and dissolves this metal afresh if a great quantity is added (L).
f. It deflagrates with nitre, which proves that it contains a phlogiston.
It is never found pure.

Order III. NEUTRAL SALTS.

Acids united to alkalies form neutral salts. These dissolved in water are no ways disturbed by the addition of an alkali; and generally, by evaporation, concrete into crystals. If, by proper tests, they show neither acid nor alkaline properties, they are said to be *perfect* neutrals; but *imperfect*, when, from defect in quantity or strength of one ingredient, the peculiar properties of the other more or less prevail.

- I. Vitriolated tartar, vitriolated vegetable alkali, or (as Morveau calls it) the *vitriol of pot-ash*.

This is a perfectly neutral salt, which results from the combination of the vitriolic acid with the vegetable fixed alkali. According to Bergman, it seldom occurs spontaneously in nature, unless where tracks of wood have been burnt down: and Mr Bowles, quoted by Mr Kirwan, says it is contained in some earths in Spain. See CHEMISTRY-Index.

It is easily obtained, by pouring the vitriolic acid on a solution of fixed vegetable alkali till it is saturated. Crystals of this neutral salt are then formed. This crystallisation succeeds better by evaporation than by cooling, according to Mongez.

The taste of this salt is disagreeable, though somewhat resembling common salt.

- II. Common nitre, (*Alkali vegetabile nitratum*).

This is known in commerce by the name of *saltpetre*, and is also called *prismatic nitre*, to distinguish it from the cubic nitre after-mentioned.—It is perfect neutral salt; resulting from the combination of the nitrous acid with the pure vegetable alkali.

According to Bergman, it is formed upon the surface of the earth, where vegetables, especially when mixed with animal-substances, putrify.—See CHEMISTRY-Index, at *Nitre*.

- III. Digestive salt, salt of Sylvius, (*Alkali vegetabile salitum*).

This neutral salt is sometimes, though rarely, met

with on the earth, generated perhaps, as professor Bergman observes, by the destruction of animal and vegetable substances.

According to Macquer, this salt has been very wrongly called *regenerated marine salt*; and the epithet of *febrifuge* has also been given to it, without any good reason, to evince that it has such a property. But M. de Morveau calls it *muriate de potasse* with great propriety.

This salt is produced by a perfect combination of the vegetable alkali with marine acid. It has been wrongly confounded with common salt.—It is found in some bogs in Picardy, and in some mineral waters at Normandy, according to Monnet, quoted by Kirwan. Mongez adds also the sea-water, as containing this salt, and that it is never found in large quantities, although its components parts are abundantly produced by nature. See CHEMISTRY-Index, at *Digestive*.

- IV. Mild vegetable alkali, (*alkali vegetabile aeratum*.)

This salt was formerly considered as a pure alkali, known by the name of *potash* and *salt of tartar*: but since the discovery of the aerial acid, it is very properly classed among the neutral salts, and ought to be called *aerated potasse*.

It results from a combination of the vegetable alkali with the aerial acid, and is hardly ever found native, unless in the neighbourhood of woods destroyed by fire.

On being exposed on a piece of charcoal, urged by the blow-pipe, it melts, and is absorbed by the coal; but,

In the metallic spoon, it forms a glassy bead, which becomes opaque when cold.

- V. Vitriolated acid saturated with mineral alkali; Glauber's salt. *Alkali minerale vitriolatum*.

This is a neutral salt, prepared by nature (as well as by art), containing more or less of iron, or of a calcareous earth; from which arises also some difference in its effects when internally used. It shoots easily into prismatical crystals, which become larger in proportion to the quantity of water evaporated before the crystallisation. When laid on a piece of burning charcoal, or else burnt with a phlogiston, the vitriolic acid discovers itself by the smell resembling the *hepar sulphuris*.

It is found in a dissolved state in springs and wells. Some of the lakes in Siberia and African,

penetrating, and suffocates animals. Its taste is acid and caustic. It quickly converts blue vegetable colours to green, and produces heat during its combination with water. But if the water be frozen, it melts, producing at the same time an extreme degree of cold. It has a remarkable action on most metals, particularly copper.

This substance is obtained by the putrefactive fermentation from animal and some vegetable matters. It is this salt which causes that strong smell which is perceived in drains and privies on a change of weather. (*Mongez*.)

Its volatility arises from a very subtle and volatile (or phlogistic) oil, which enters as a principle into its composition. (*Macquer*.)

(L) The solution of copper by this alkali, which is of a fine blue, presents a remarkable phenomenon. For if it be kept in a well closed phial, the colour decays, and at length disappears, giving place to transparency. But on opening the phial, the surface or part in contact with the air becomes blue, and the colour is communicated through the whole mass. This experiment may be many times repeated with the same success.

can, and many springs in other places, contain this salt, according to Bergman. It is found in the sea-water; also in the earth, at several parts of Dauphiné in France, and in Lorraine; and sometimes it germinates on the surface of the earth, according to Monet, quoted by Kirwan. It is found, in a dry form, on walls, in such places where aphronitrum has effloresced through them, and the vitriolic acid has happened to be present; for instance, where marcasites are roasted in the open air. This salt is often confounded with the aphronitum or mild mineral alkali.

VI. Cubic or quadrangular nitre. *Alkali minerale nitratum.*

This is the neutral salt which results from the combination of mineral alkali with nitrous acid. It has almost all the characters of prismatic or common nitre, from which it only differs on account of its base; and takes its denomination from the figure of its crystals, which appear cubic.

This salt rarely occurs but where marine plants putrify. According to Bowles, quoted by Kirwan, it is found native in Spain. See CHEMISTRY, n° 741, &c.

VII. Common salt, or sea-salt; *Alkali minerale salitum, sal commune.*

This salt shoots into cubical crystals during the very evaporation; crackles in the fire, and attracts the humidity of the air. It is a perfectly neutral salt, composed of marine acid, saturated with mineral alkali. It has a saline but agreeable flavour. See CHEMISTRY-Index, at Sea-salt.

A. Rock salt, fossile salt; *Sal montanum.* Occurs in the form of solid strata in the earth.

1. With scaly and irregular particles.

- a. Grey, and
- b. White. These are the most common, but the following are scarcer:
- c. Red;
- d. Blue; and
- e. Yellow, from Cracow in Poland, England, Salzburg, and Tirol.

2. Crystallised rock salt; *sal gemma.*

- a. Transparent, from Cracow in Poland, and from Transylvania.

B. Sea-salt.

This is produced also from sea-water, or from the water of salt lakes by evaporation in the sun, or by boiling.

The seas contain this salt, though more or less in different parts. In Siberia and Tartary there are lakes that contain great quantities of it.

C. Spring sea-salt.

This is produced by boiling the water of the fountains near Halle in Germany, and other places.

Near the city of Lidköping, in the province of Westergotland, and in the province of Dal, salt-springs are found, but they contain very little salt: and such weak water is called *sölen* by the Swedes.

VIII. Borax.

This is a peculiar alkaline salt, which is sup-

posed to belong to the mineral kingdom, and cannot be otherwise described, than that it is dissoluble in water, and vitrescible; that it is fixed in the fire; and melts to a glass; which glass is afterwards dissoluble in water. See the detached article BORAX.

IX. Mild mineral alkali; *Alkali minerale aeratum.* Natron, the nitre of the ancients.

This neutral salt is a combination of the mineral alkali with the aerial acid or fixed air. It is found plentifully in many places, particularly in Africa and Asia, either concreted into crystallised strata, or fallen to a powder; or efflorescing on old brick walls; or lastly, dissolved in springs. It frequently originates from decomposed common salt.

This is an imperfect neutral salt, and was formerly considered as a pure alkali; but the discovery of the aerial acid has shown the mistake.

1. It has nearly all the properties of the pure mineral alkali N° II. A. 1. (p. 90.), but with less energy.
2. The vegetable blue colours are turned green by this salt; it effloresces with acids, and has an urinous taste.
3. It is soluble in twice its weight of cold water; but if the water is hot, an equal weight is sufficient for its solution.
4. It effloresces when exposed to the action of the atmosphere.
5. It fuses easily on the fire, but without being decomposed.
6. Facilitates the fusion of vitrifiable earths, and produces glass more or less fine according to their qualities.
7. It is decomposable by lime and ponderous earth, which attract the aerial acid.
8. And also by the mineral acids; but these expel the aerial acid of this salt, by seizing its alkaline basis, (*Mongez.*)

Wallerius confounds this salt with the aphronitrum after-mentioned, and calls it *halinitrum*, when it contains some phlogiston. Mr Kulbel, quoted by Wallerius, showed that it exists in some vegetable earths, and takes it to be the cause of their fertility; but this (M. Magellan observes) can only be on account of its combination with the oily parts of them, and forming a kind of soap, which is miscible with the watery juices.

X. Vitriolic ammoniac, (*Alkali volatile vitriolatum.*)

This neutral salt was called *secret salt of Glauber*, and is a combination of the volatile alkali with vitriolic acid. According to Bergman, it is scarcely found any where but in places where the phlogisticated fumes of vitriolic acid arise from burning sulphur, and are absorbed in putrid places by the volatile alkali. Thus at Fahlun the acid vapour from the roasted minerals produces this salt in the necessary-houses. Dr Withering, however, observes, that as volatile alkali may be obtained in large quantities from pit-coal, and produced by processes not dependent upon putrefaction, there is reason to believe that the vitriolic ammoniac may be formed in several ways not noticed by the above author.

It

It is said to have been found in the neighbourhood of volcanoes, particularly of Mount Vesuvius, where, indeed, it might well be expected; yet its existence seems dubious, since Mr Bergman could scarce find any trace of it among the various specimens of salts from Vesuvius which he examined. The reason (according to M. Magellan) probably is, that the vitriolic acid disengaged by the combustion of sulphur is in a phlogisticated state; and all its combinations in this state are easily decomposed by the marine acid, which plentifully occurs in volcanoes. It is also said to be found in the mineral lakes of Tuscany, which is much more probable, as the vitriolic acid when united to water easily parts with phlogiston, and recovers its superiority over other acids. It is said likewise that this neutral salt is found on the surface of the earth in the neighbourhood of Turin.

1. This salt is of a friable texture, and has an acrid and urinous taste.
2. Attracts the moisture of the atmosphere.
3. Is very soluble in water, it requiring only twice its weight of cold water, or an equal weight of boiling water, to be dissolved.
4. It becomes liquid on a moderate fire; but if urged,
5. It becomes red hot, and volatilizes.
6. The nitrous and muriatic acid decompose this salt by seizing the volatile alkali. But
7. Lime, ponderous earth, and pure fixed alkali, set the volatile alkali free, and combine with the vitriolic acid.
8. According to Kirwan, 100 parts of this salt contain about 42 of real vitriolic acid, 40 of volatile alkali, and 18 of water.

This vitriolic ammoniac is easily known; for if quicklime or fixed alkali be thrown into its solution, the smell of the volatil alkali is perceived; and if this solution be poured into that of chalk or ponderous earth by the nitrous acid, a precipitate will appear.

XI. Nitrous ammoniac, (*Alkali volatile nitratum.*)

This is a neutral salt, which results from the combination of the nitrous acid with the volatile alkali. It is frequently found in the mother-liquor of nitre. When mixed with a fixed alkali, the volatile betrays itself by its smell.

1. It is of a friable texture, of a sharp bitter, and of a nitrous or cooling taste.
2. According to Mongez, it attracts the moisture of the atmosphere; but Romé de l'Isle asserts, that its crystals are not deliquescent: the experiment may be easily tried, and the truth ascertained.
3. It is soluble in cold water; but half the quantity of water, if boiling, is sufficient for dissolving it.
4. It liquefies on the fire, and afterwards it becomes dry.
5. It detonates with a yellow flame before it is red hot; and what is peculiar to this salt, it needs not, like common nitre, the contact of any combustible matter for its detonation;

from whence it appears that the volatile alkali itself possesses a great share of phlogiston.

6. Its component parts, viz. the nitrous acid and the volatile alkali, are not very intimately united; and of course,
7. It is easily decomposed by all the substances that have any affinity to either of them.
8. Mixed with the muriatic acid it makes aqua regia.
9. One hundred parts of this neutral salt contain 46 of nitrous acid, 40 of volatile alkali, and 14 of water, as Mr Kirwan thinks.

XII. Native sal ammoniac. The muriatic (or marine) acid saturated with a volatile alkali.

This is of a yellowish colour, and is sublimed from the flaming crevices, or fire-springs, at Solfatara, near Naples.

XIII. Aerated or mild volatile alkali.

This neutral salt results from the combination of volatile alkali united to the aerial acid. It was formerly considered as a pure alkali:— But the discovery of the aerial acid (or fixed air) has shown it to be a true neutral salt, though imperfect; as it retains still all the properties of an alkali, though in a weaker degree, on account of its combination with the aerial acid, which is itself the most weak of all acids, and of course other stronger acids easily dislodge it from its base, and from various ammoniacal salts.

1. This imperfect neutral salt has an urinous taste, and a particular smell, which is very penetrating, though less pungent, than the pure volatile alkali; and in the same manner it turns the blue vegetable juices green. But,
2. It effervesces with other acids stronger than the aerial one, which the pure or caustic volatil alkali does not.
3. It sublims very easily with a small degree of heat;
4. And dissolves in twice its weight of cold water; but in a lesser quantity, when this last is boiling hot.
5. It acts on metallic substances, chiefly on copper, with which a blue colour is produced.

According to Bergman, this salt was found in a well in London (Phil. Trans. for 1767), at Frankfort on the Mein, and at Lauchstadt.— Messrs. Hierne, Henkel, and Brandt, have found also this salt in the vegetable earth, in various kinds of argil, and in some stony substances. Mr Vozel found it also in some of the incrustations at Gottingen; and Mr Malouin in some acidulous waters of France.

M. Magellan observes, that the borax and the three aerated alkalis are called *imperfect* neutrals; whilst the other neutral salts have acquired the name of *perfect*, because these last do not exhibit any of the distinguishing properties of their component parts. The three aerated alkalis have a very distinct alkaline character, as they turn blue vegetable juices green, though not of so vivid a colour as the caustic alkali

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alkali does; and the borax is capable of receiving almost an equal quantity of its sedative acid, without losing all its alkaline properties.

In general, those neutral salts, consisting of fixed alkalies combined with acids, are more saturated than those composed of volatile alkali called ammoniacal salts, or those called aerated; which last are only composed by the combination of the aerial acid, united to any alkaline or earthy base.

The aerated alkalis are called also by the name of *mild* alkalis, because they possess no longer that sharp corroding quality which they exhibit when deprived of the aerial acid or fixed air; in which case they are termed caustic alkalis.

These aerated alkalis differ also from the caustic ones, not only on account of the mildness of their taste, from which comes their epithet of mild alkalis, but also by their property of crystallising, and by their effervescing with other acids, which expel the aerial one, the weakest of all acids we know.

Order IV. EARTHY Neutral Salts.

THE compounds of earths and acids which possess solubility are decomposed and precipitated by mild, but not by phlogisticated alkalis.

I. Calcareous earth combined with vitriolic acid.—

Vitriolated calx; Selenite; Gypsum. See p. 72. col. 1. *supra*.

The gypsum, or plaster, is not only found dissolved in various waters, but also in many places it forms immense strata. It is placed by all mineralogists among the earths, which it greatly resembles; but it rather belongs to the saline substances of the neutral kind, as appears by its constituent parts. When burnt, it generates heat with water, but in a less degree than lime does. Berg. Sciag. § 59.

This salt has a particular taste, neither bitter nor astringent, but earthy, when applied to the tongue; and it is owing to it that some waters, chiefly from pumps and wells, are called hard waters, because they lie heavy on the stomach.

It is unalterable whilst kept in a dry place; but on being exposed to a moist air, it is much altered, and suffers a kind of decomposition.

When exposed to fire so as to lose the water off its crystallisation, it assumes a dead white colour; and it is then what we call plaster of Paris; but if the fire is too strong, it melts and vitrifies, after losing the vitriolic acid with which it is saturated. See GYPSUM.

The most famous quarries of gypsum in Europe, are those of Montmartre, near Paris. See *Journal de Physique*; 1780, vol. xvi. p. 289 and 1782, vol. xix. p. 173.

It is found also in the vegetable kingdom.—Mr Model found that the white spots in the root of rhubarb are a selenitical or gypseous earth (*Journal de Phys.* vol. vi. p. 14.)

What is called fossil flour (*farine fossile* in French), generally found in the fissures of rock and gypseous mountains, is very different from the *agaricus mineralis* p. 71. col. 1. and from the *lac lunæ* p. 87. col. 1.; as it is a true gypseous

earth, already described p. 72. col. 1. which, according to Mongez, is of a white and shining colour, though sometimes it assumes a reddish or blueish colour, on account of some martial mixture.

II. Nitre of lime, (*Calx nitrata*.)

This earthy salt is sometimes found in water, but very sparingly. It is said that the chalk hills in some parts of France become spontaneously impregnated with nitrous acid, which may be washed out, and after a certain time they will become impregnated with it again. It is a combination of the nitrous acid with calcareous earth. (*Berg. Sciagr.*)

1. It is deliquescent; and is soluble in twice its weight of cold water, or in an equal weight of boiling water.
2. Its taste is bitter.
3. Is decomposed by fixed alkalies, which form the cubic and the prismatic nitres.
4. But caustic volatile alkali cannot decompose it.
5. It does not deflagrate in the fire; yet paper moistened with a saturated solution of it crackles in burning.
6. In a strong heat it loses its acid.
7. Its solution does not trouble that of silver in nitrous acid.
8. The vitriolic acid precipitates its basis.
9. As does likewise the acid of sugar.
10. One hundred parts of it contain, when well dried, about 33 of nitrous acid, 32 of calcareous earth, and 35 of water.

It exists in old mortar, and in the mother liquor of nitre; and also in the chalk rocks near Roche Guyon, in France. (*Kirwan.*)

III. Muriatic chalk, or fixed salt ammoniac. *Acidum salis communis terra calcarea saturatum.*

This somewhat deliquesces, or attracts the humidity of the air. It is found in the sea water.

It is with great impropriety that this salt has obtained the name of ammoniac, on account only of its being formed in the chemical laboratories during the decomposition of the ammoniacal salt with lime, in the process for making the caustic volatile alkali. In this case, the muriatic acid unites to the calcareous basis, while this last gives its water to the volatile alkali; which, therefore, comes over in a fluid caustic state: but if chalk is employed instead of lime, the volatile alkali receives the aerial acid instead of water, and comes over in a concrete form. In neither case, the new combination of calcareous earth with muriatic salt has any volatile alkali to deserve the name of ammoniacal salt. (*Macquer.*)

1. This earthy salt has a saline and very disagreeable bitter taste. It is supposed to be the cause of that bitterness and nauseous taste of sea-water.
2. It fuses in the fire, and becomes phosphorescent, after undergoing a strong heat.
3. It becomes hard, so as to strike fire with steel.
4. It is then the phosphorus of Homberg.
5. It is decomposable by ponderous earth and fixed alkalis.

8.

6. And

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6. And also by the vitriolic or nitrous acid; which expel the muriatic acid, to unite with the calcareous basis. (*Mongez.*)
7. Its solution renders that of silver in the nitrous acid turbid, at the same time that
8. It makes no change in that of nitrous selenite.
9. It obstinately retains its acid in a red heat.
10. One hundred parts of this earthy salt contain, when well dried, about 42 of marine acid, 38 of calcareous earth, and 20 of water.
11. It is found in mineral waters, and in the salt works at Saltzburg. (*Kirwan.*)

IV. Aerated chalk, (*Calx aerata.*)

Whenever calcareous earth is over saturated with the aerial acid, it becomes a true earthy neutral salt; becomes soluble in water, and has a slight pungent bitter taste. It is commonly found dissolved in waters, in consequence of an excess of the aerial acid. When this greatly abounds, the water is said to be hard (*cruda*). By boiling or by evaporation, it deposits streaks or crusts of calcareous matter.

But when the calcareous earth is only saturated with the aerial acid without excess, it is not easily soluble; it is then the calcareous spar p. 71. col. 2. and is properly referred to the class of earths, p. 71. col. 1.

V. Vitriolated ponderous earth. *Terra ponderosa vitriolata; barytes vitriolata.*

This earthy salt, known by the name of ponderous spar, is a combination of the ponderous earth described in p. 75. col. 1. with the vitriolic acid; and has been already treated of.

The nitrous ponderous earth, according to Bergman, has not yet been found, although it may perhaps exist somewhere, and of course be discovered in nature.

VI. Muriatic barytes, marine baro-selenite. *Barytes salita.*

This earthy salt consists of marine acid united to the ponderous earth. It is said to have been found in some mineral waters in Sweden; and may be known by its easy precipitability with vitriolic acid, and by the great insolubility and weight of this resulting compound, which is the true ponderous spar of the preceding section.

VII. Aerated ponderous earth. *Barytes aerata.*

This earthy neutral salt was found by Dr Withering in a mine at Alstonmore in the county of Cumberland in England. He says that it is very pure, and in a large mass. This substance is a new acquisition to mineralogy, and may be turned to useful purposes in chemistry.

1. It effervesces with acids, and melts with the blow-pipe, though not very readily.
2. In a melting furnace, it gave some signs of fusion; but did not feel caustic when applied to the tongue, nor had it lost its property of effervescing with acids.
3. But the precipitated earth from a saturated solution of it in the marine acid, by the mild vegetable or mineral alkali being burned, and thrown into water, gave it the properties of lime-water, having an acrid taste in a high

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degree: and a single drop of it added to the solutions of vitriolated salts, as the Glauber's salt, vitriolated tartar, vitriolic ammoniac, alum, Epsom salt, selenite, occasioned immediately a precipitation; from whence it appears to be the nicest test to discover the vitriolic acid. By it the marine acid may also be easily freed from any mixture of vitriolic acid, by means of this calx of ponderous earth. See CHEMISTRY, n^o 1049. *et seq.*

VIII. Vitriolated magnesia.

This earthy neutral salt is called by the English *Epsom salt*; *Sel d'Angleterre* by the French, and also *sel de Sedlitz*, *de Seydschutz*, *sel amer*, *sel cathartique amer*, &c. These various names are given to it, either on account of its properties, it being a very mild purgative; or from the places where it is found, besides many others, as in the waters of Egra, of Creutzbourg, Obernental, Umea, &c. It has also been found native, mixed with common salt and coaly matter, germinating on some free stones in coal mines. See *Kirwan's Mineralogy*, p. 183.

1. It has a very bitter taste.
2. It is soluble in one part and a half of its weight of cold water: but in hot water, a given weight of it dissolves the double of this salt.
3. It effloresces when exposed to a dry atmosphere, and is reduced to a white powder.
4. Exposed to the fire, it loses the water of its crystallisation, and is reduced into a friable mass.
5. This earthy salt is decomposed by fixed and volatile alkalies.
6. Lime-water precipitates the magnesia from its solution, the calcareous earth of lime-water combining itself with the vitriolic acid, and forming a selenite. *N. B.* By this test the vitriolated magnesia is easily distinguished from the vitriolated mineral alkali or Glauber's salt which it resembles.
7. But crude chalk, or aerated calcareous earth, has not such an effect in the same case; which shows how much the efficacy of this substance, viz. the calcareous earth, is diminished merely by its union with the aerial acid.
8. When urged by the flame with the blow-pipe, it froths; and may be melted by being repeatedly urged with that instrument.
9. With borax it effervesces, and also when burned with the microcosmic salt.
10. According to Bergman, 100 weight of this salt contains only 19 parts of pure magnesia, 33 of vitriolic acid: and 48 of water. But
11. According to Kirwan, 100 parts of it contain about 24 of real vitriolic acid, 19 of magnesian earth, and 57 of water.

IX. Nitrated magnesia; nitrous Epsom salt.

This earthy salt is usually found together with nitre. It is a combination of the nitrous acid with the magnesian earth.

1. It has an acrid taste, very bitter.
2. Attracts the moisture from the atmosphere, and deliquesces.
3. Is very soluble in water.

4. Is

4. Is easily decomposable by fire.
5. The ponderous and calcareous earths decompose it, and also the alkalies.
6. On being urged by the blow-pipe, it swells up with some noise, but does not detonate.
7. If saturated solutions of nitrous felenite and of this salt be mixed, a precipitate will appear; but,
8. Neither vitriolic acid, nor mild magnesia, will occasion any turbidness in its solution.
9. One hundred parts of this salt contain about 36 of real nitrous acid, 27 of magnesian earth, and 37 of water.

It exists in old mortar, and is found also in the mother liquor of nitre. As lime-water decomposes it, M. de Morveau has indicated the use of this process, not only to complete its analysis; but also to separate, in large quantities, and at a very cheap rate, the magnesian from the calcareous earth, as M. Mongez relates upon this subject.

X. Muriatic magnesia. *Magnesia salita.*

This earthy salt is a combination of magnesian earth with the muriatic acid. According to Bergman, it is found in the sea in greater plenty than any other salt except the sea-salt.

1. It has a very bitter taste: and being always mixed in the sea-water, it is the principal cause of its bitterness.
2. It is very deliquescent, and soluble in a small quantity of water.
3. All the alkalies, even the caustic volatile alkali and lime, decompose it by precipitating its basis.
4. The vitriolic, nitrous, and boracic acids expel the muriatic acid from the base of this neutral salt.
5. Its solution does not trouble that of nitrous or marine felenite; but,
6. It causes a cloud in the nitrous solution of silver.
7. The vitriolic acid throws down no visible precipitate from the solution of this neutral salt.
8. It loses its acid in a red heat.

XI. Aerated magnesia.

Common magnesia, with an excess of aerial acid, is a true neutral salt, like the aerated felenite of p. 96. col. 1. and becomes soluble in cold water. Otherwise it is scarce soluble at all; and is then classed among the earths.

This neutral salt is decomposable by fire, by which its water and its acid are expelled; and it may become phosphoric.

When urged by fire, it agglutinates a little: and some pretended that it melts. But it must be in an impure state to vitrify at all.

The three mineral acids, and the alkalies, dissolve this salt with effervescence, by expelling the aerial acid.

XII. Argillaceous earth combined with vitriolic acid. The *alum* kind. See ALUM, and CHEMISTRY-Index.

- a. With a small quantity of clay; native or plumose alum.

It is found on decayed alum ores in very small

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quantities; and therefore, through ignorance, the alabastrites and felenites, both of which are found among most of the alum slates, are often substituted in its stead, as is also sometimes the albestus, notwithstanding the great difference there is between the alum and these both in regard to their uses and effects.

- b. With a greater quantity of pure clay; white alum ore.

1. Indurated pale-red alum ore, (*schistus aluminis Romanus.*) It is employed at Lumini, not far from Civita Vecchia in Italy, to make the pale-red alum called *roch alum*. This is, of all alum ores, the most free from iron; and the reddish earth which can be precipitated from it, does not show the least marks of any metallic substance.

- c. With a very large quantity of martial clay, which likewise contains an inflammable substance: Common alum ore. This is commonly indurated and slaty, and is therefore generally called *alum slate*.

It is found,

1. With parallel plates, having a dull surface; from Andrarum in the province of Skone, Hunneberg and Billingen in the province of Westergottland, Rodoen in the province of Jemtland, and the island of Oeland, &c. In England, the great alum works at Whitby in Yorkshire are of this kind.
2. Undulated and wedge-like, with a shining surface. This at the first sight resembles pit-coal; it is found in great abundance in the parish of Nas in Jemtland.

XIII. Argillaceous earth saturated with muriatic acid. *Argilla salita.*

Professor Bergman says, that the combinations of the argillaceous earth with the nitrous, muriatic, and aerial acids, had not yet been found naturally formed as far as he knew. But Dr Withering affirms, that he found the muriatic argil to exist in a considerable quantity, in the Nevil Holt water, when he analysed that mineral water about the year 1777: and he adds, that it is probably contained also in the Ballycastle water in Ireland.

XIV. Argillaceous earth mixed with volatile alkali.

[Although this mixture is by no means a neutral salt, this seems to be the place to treat of it according to the order of saline substances adopted in this article.]

The greatest part of the e'ays contain a volatile alkali, which discovers itself in the distillation of the spirit of sea-salt. &c.

Order V. METALLIC SALTS.

THE native salts belonging to this division may be distinguished by the phlogisticated alkali, which precipitates them all. The few which have saline properties, according to the definition of salts formerly given, shall be mentioned here; referring the rest to the mineralised metals; as the *luna cornea*, the saline quicksilver or muriatic mercury, &c.

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I. Vi

*Metallic
Neutral
SALTS.*

I. Vitriol of copper; blue vitriol. *Vitriolum veneris, seu cyprium.*

This neutral metallic salt is a combination of the vitriolic acid with copper, and is found in all *mineral waters*, as they are called. Its colour is a deep blue; and being long exposed to the air, it degenerates into a rusty yellow blue. Urged by the flame of the blow-pipe on a piece of charcoal, it froths at first with noise, giving a green flame, and the metallic particles are often reduced to a shining globule of copper, leaving an irregularly figured scoria. But with borax the scoria is dissolved, and forms a green glass.

This salt rarely occurs crystallised; but is often found naturally dissolved in water in Hungary, Sweden, and Ireland: from this water a blue vitriol is generally prepared. These natural waters are called *cementatory* or *cementing* ones. According to Monet, this concrete salt, when found naturally formed, only proceeds from the evaporation of such waters. It is also occasionally extracted from sulphurated copper ores after torrefaction. See *CHEMISTRY-Index*, at *Vitriol*.

II. Muriatic copper, or marine salt of copper. *Cuprum salitum.*

This salt has been found in Saxony, in the mine of Johngeorgenstadt. 1. It is of a greenish colour, and foliated texture. 2. It is moderately hard. 3. Sometimes it is transparent and crystallised.

It has been taken for a kind of mica: but Professor Bergman found it to consist of copper and marine acid, with a little argillaceous earth.

Another specimen of a purer sort was deposited in the museum of Upsal. This is of a bluish green colour, and friable. It effervesced with nitrous acid, to which it gave a green colour: and by adding a proper solution of silver, a *luna cornea* was formed, by which the presence of the muriatic acid was ascertained. (*Kirwan and Bergman*)

III. Martial vitriol; vitriol of iron. Common green vitriol or copperas.

This is the common green vitriol, which is naturally found dissolved in water, and is produced in abundance by decayed or calcined marcasites.

This metallic neutral salt results from the combination of the vitriolic acid with iron.

1. It is of a greenish colour when perfectly and recently crystallised; but,
2. Effloresces by being exposed to the air, becomes yellowish, and is covered with a kind of rust. Sometimes it becomes white by long standing.
3. It requires six times its weight of water, in the temperature of 60 degrees, to be dissolved.
4. It has an astringent, harsh, and acidulous taste.
5. Exposed to a moderate heat, even to that of the sunshine, it falls into a yellowish powder: but,
6. On being exposed to a sudden heat, it melts; and on cooling, assumes a whitish brown colour.
7. When strongly urged by fire, it loses its acid, becomes of a dark red colour, and is then called *colcothar*; a powder which is employed in polishing metals, and to which our artists have

applied the improper name of *crocus martis*, though this name only belongs to the yellow preparations of the iron-calces, used in pharmacy and in enamelling, &c.

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8. Pure fixed alkali precipitates the iron from its solution in deep green flakes; the mild alkali, in a greenish white colour; pure volatile alkali, in so deep a green, that it appears black; but the mild volatile alkali precipitates it in a greyish-green colour.

9. All vegetable astringents, as the tincture of tea, quinquina, gales, &c. precipitate the iron in a black colour: hence they are used as tests to discover its presence in chemical analyses; and it is from this black precipitate that the common writing ink is made, being diluted in water, and there suspended by the Arabic or Senegal gums.

10. One hundred parts of this salt, recently crystallised, contain 20 of real vitriolic acid, 25 of iron, and 55 of water.

11. Its acid is known by this, that its solution mixes without turbidity with the solutions of other salts that contain vitriolic acid; as Epfom, selenite, vitriolated tartar, &c.

12. And the basis of this metallic salt is known by the black colour produced by the solution of vegetable astringents.

13. On being urged by the flame thrown by the blow-pipe, it offers the same phenomena as the vitriol of copper, except that it does not colour the flame.

Green vitriol is frequently found native, either in coal mines or in the cavities of pyritaceous mines, or adhering to their scaffolds in a stalactitical form. It is found also in small round stones, called *ink-stones*, of a white, red, grey, yellow, or black colour, which are almost soluble in water, and contain a portion of copper and zinc. Also sometimes in form of schistus or slaty pyritaceous stones. But the greatest part of that in use is prepared by art, from the martial pyrites or mundic. See *CHEMISTRY*, n° 619.

IV. Aerated iron. *Ferrum aeratum.*

This metallic salt is a combination of the aerial acid with iron; and is found in the light chalybeate waters, where it is dissolved by an excess of this acid.

Mr Lane was the first who discovered in England the action of the aerial acid on iron, when the water is impregnated with that menstruum. The late M. Rouelle demonstrated the same phenomenon in France upon this and other metals. But Professor Bergman seems to have preceded them both nearly about the same time, though neither had any knowledge of each other's discoveries.

The great volatility of this acid is the cause why this neutral salt is not often found. For the mere evaporation of the ferruginous mineral waters, in order to analyse them, is sufficient to let loose the aerial acid; so that the iron which was there dissolved by its power falls down to the bottom in the form of a light ore, which amounts to nearly $\frac{1}{100}$ of the weight of the water; and when

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when fresh retains so much phlogiston as to obey the magnet, as Bergman says.

V. Vitriol of cobalt, or vitriolated cobalt.

This metallic salt results from the combination of the vitriolic acid with cobalt.

1. When found native, it is always in an efflorescent state; whence it arises that, in this case,
2. Its colour is greenish, mixed with a grey tint: but,
3. It is of a rosy colour when artificially made;
4. Effloresces when exposed to the action of the atmosphere; and,
5. Takes then a greenish colour mixed with a pale purple, or a *Lilias* colour, as the French call it.
6. It is difficultly soluble in water; and,
7. Its solution is of a red colour.
8. The phlogisticated alkali precipitates the cobalt from the solution of this salt, which with borax gives an azure glass.

By the above qualities, chiefly the rosy colour of the solution of this neutral salt, its basis is sufficiently distinguished. As to its acid, it is easily known by the same tests as those of the preceding vitriols.

It is said to be found native in small pieces, mixed with a greenish efflorescence in cobalt mines. (*Kirwan and Mongez.*)

VI. Vitriol of zinc, vitriolated zinc, or white vitriol.

This neutral metallic salt results from the combination of vitriolic acid with zinc.

1. Its colour is white. It,
2. Requires little more than twice its weight of water to dissolve it in the temperature of 60 degrees of Fahrenheit's thermometer, and deposits a greyish yellow powder.
3. Its specific gravity is 2000.
4. Its taste is very styptic.
5. It mixes uniformly with vitriolic neutral salts.
6. Precipitates nitrous or marine selenites from their solutions, by which its acid is ascertained.
7. It is precipitable in a whitish powder by alkalies and earths; but,
8. Neither iron, copper, nor zinc, precipitate it: by which circumstance its basis is sufficiently indicated.
9. If it contains any other metallic principle, this may be precipitated by adding more zinc to the solution; excepting iron, which will of itself precipitate by exposure to the air or boiling in an open vessel.
10. One hundred parts of this metallic salt contain 22 of vitriolic acid, 20 of zinc, and 58 of water.
11. Urged by fire, it loses a good part of its acid.
12. Treated with the blow-pipe, it exhibits nearly the same phenomena as other metallic vitriols; except only that the flame is brilliant when the zinc is reduced, and gives out white flocs called *flowers of zinc*.

This neutral metallic salt is sometimes found native, mixed with vitriol of iron, and in the form of white hairy crystals; or in a stalac-

titical form in the mines of Hungary, or as an efflorescence on ores of zinc. It is also found dissolved in mineral waters, and generally with some proportion of vitriols of iron and copper. Bergman says, it is sometimes produced by the decomposition of pseudogallena, or black-jack; but this rarely happens, because this substance does not readily decompose spontaneously.

But that in common use is mostly prepared at Goslar, from an ore which contains zinc, copper, and lead, mineralised by sulphur and a little iron. The copper is first separated as much as possible: the remainder after torrefaction and distillation is thrown red-hot into water and lixiviated. It is never free from iron. (*Kirwan, Mongez.*)

VII. Vitriolated nickel, or vitriol of nickel

This neutral metallic salt results from the combination of the vitriolic acid with nickel. It exists sometimes in consequence of the decomposition of the sulphureous ores of this semimetal. It is found native, efflorescing on Kupfer-nickel; and generally mixed with vitriol of iron.—It is of a green colour, as well as its solution. It is precipitated by zinc; but when joined with iron, this last is not precipitated by the same.

Its origin is perhaps owing to the decomposition of the pyritaceous and sulphureous ore of Kupfer-nickel, mentioned by Wallerius. This ore contains a great quantity of arsenic and sulphur, as well as cobalt, nickel, and iron. And if it comes to be decomposed in the bowels of the earth, it is natural to expect that the vitriolic acid of the sulphur will attack the nickel and the iron, with which it will form neutral metallic salts (*Mongez, Kirwan*).

VIII. Muriatic manganese. *Manganesium salitum.*

M. Hielm is the only person who has as yet found this middle salt in some mineral waters of Sweden. It is composed by the combination of the regulus of Manganese with muriatic acid.

1. It is precipitated of a whitish yellow colour, by the Prussian (phlogisticated) alkali; and of a brownish yellow, by the mineral alkali.
2. It does not crystallise in any distinct form.
3. It abstracts the moisture of the air.
4. To obtain its basis free from iron, it must be precipitated by the mineral alkali; redissolved in nitrous acid; then calcined until this acid is expelled; and the residuum is to be treated with distilled vinegar, which will then take up only the manganese. (*Kirwan.*)

Order VI. TRIPLE SALTS.

THE neutral salts hitherto enumerated are such as are composed of two ingredients only; but sometimes three or more are so united as not to be separated by crystallization. The vitriols that we are acquainted with are hardly ever pure; and two or three of them sometimes are joined together.

Sometimes likewise it happens that neutral salts join earthy salts, and earthy salts metallic ones. Bergman generally distinguishes compound salts according to the

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the number of their principles, whether the same acid be joined to several bases, or the same base to different acids; or, lastly, whether several menstrua and several bases are joined together. Hence arise salts triple, quadruple, &c. which the diligence of after-times must illustrate. The most remarkable examples of triple and quadruple native salts which have yet occurred are,

I. Mineral alkali, with a small quantity of calcareous earth. *Alkali salis communis*. Aphronitrum.

This is so strongly united with the calcareous earth, that the latter enters with it into the very crystals of the salt: though by repeated solutions the earth is by degrees separated from it, and falls to the bottom after every solution.

It grows in form of white frost on walls, and under vaults; and in places where it cannot be washed away by the rain.

Hence it would appear, that this is not only a triple, but a multiple salt; as these pieces of old mortar covered with this white frost, on ancient walls, are the very same from which the saltpetre makers extract the mother-water of nitre, after mixing therewith the vegetable ashes, to furnish the alkaline base to it. M. Fourcroy says in his seventeenth Lecture, that this mother-water contains not only nitre, but five other kinds of salt, viz. the marine salt, nitrous magnesia, calcareous nitre, magnesia nitrata, and calx salita; to which the chemists of Dijon add the digestive salt of Sylvius, and in some cases various vitriols with alkaline or earthy bases.

When it contains any considerable quantity of the calcareous earth, its crystals become rhomboidal, a figure which the calcareous earth often assumes in shooting into crystals: but when it is purer, the crystals shoot into a prismatic figure.

This is a circumstance which necessarily must confuse those who know the salts only by their figure; and shows, at the same time, how little certainty such external marks afford in a true distinction of things.

This salt is very often confounded with the *sal mirabile Glauberi*.

II. Common salt with magnesia; or muriatic mineral alkali contaminated by muriatic magnesia.

This is a compound of the common salt with muriatic magnesia: and by the expression contaminated (*inquinatum*) of professor Bergman, we may suppose that the magnesian salt is not intimately united to the alkaline base.

This triple salt is very deliquescent; a quality it owes to its integrant part the muriatic magnesia, (p. 97. col. 1.) For the pure muriatic alkali does not deliquesce: but this degree of purity is seldom found, even in the native fossil or *sal gem*, (p. 93. col. 2.) In general all the earthy marine salts are very deliquescent, as the muriatic chalk, the muriatic barytes, and the muriatic magnesia. Bergman, Macquer, and Mongez.

III. Mineral alkali with succinous acid and phlogiston.

This substance will be afterwards mentioned among the inflammables.

IV. Vitriolated magnesia with vitriol of iron. Epsom salt contaminated with copperas.

Found in some mineral waters, according to Mr Monnet, (*Treatise on Mineral Waters*).

V. Native-alum contaminated by copperas. Vitriolated argil with vitriol of iron.

Found in the aluminous schistus. It sometimes effloresces in a feathery form. Perhaps this is the *plumose alum* of the ancients.

VI. Native alum, contaminated by sulphur.

At the places about Wednesbury and Bilston, in Staffordshire, where the coal pits are on fire, this substance sublimes to the surface; and may be collected, in considerable quantity, during dry or frosty weather.

A similar compound substance sublimes at the Solfaterra near Naples.

VII. Native alum contaminated by vitriolated cobalt.

In the mines of Herregrund and Idria this salt may be seen shooting out into long slender filaments. Perhaps this is the *trichites* of the Greeks.

1. Dissolved in water, it immediately betrays the presence of vitriolic acid upon the addition of terra poderosa salita (muriatic acid saturated with heavy earth).

2. By the addition of phlogisticated alkali, a precipitate of cobalt is thrown down, which makes blue glass with borax or microcosmic salt. (*Berg. Sciag.*)

VIII. Vitriol of copper with iron.

This salt is of a bluish-green colour. It is the *vitriolum ferreo-cupreum cyaneum* of Linnæus. Its colour varies, being sometimes more or less green, and sometimes more or less blue. It is found at Saltzberg and at Falhun. This vitriol is called *vitriol of Hungary*, because it is found in the Hungarian mines is of this kind. (*Mongez.*)

IX. Vitriol of copper, iron, and zinc.

This is the *vitriolum ferreo-zinceo-cupreum cyaneum* of Linnæus. Its colour is of a blue inclining to green. If rubbed on a polished surface of iron, the copper is not precipitated thereby, as it happens to the blue vitriol; which shows that the vitriolic acid is perfectly saturated in this salt by the three metallic bases.

X. Vitriol of copper and zinc.

This is the blue vitriol from Goslar. According to Mongez it is the *vitriolum zinceo-cupreum caruleum* of Linnæus.

XI. Vitriol of iron and zinc.

This is the green vitriol from Goslar in the Hartz. According to Mongez, this is the *vitriolum zinceo-ferreum viride* of Linnæus, 105. 6. Its colour is a pale-green cast.

XII. Vitriol of iron and nickel.

This salt is of a deep-green colour, and is contained in the ochre, or decayed parts, of the nickel, at the cobalt-mines of Los, in the province of Helsingland.

CLASS III. MINERAL INFLAMMABLE SUBSTANCES.

To this class belong all those subterraneous bodies that are dissoluble in oils, but not in water, which they

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mables.

repel; that catch flame in the fire; and that are electrical.

It is difficult to determine what constitutes the difference between the purer sorts of this class, since they all must be tried by fire, in which they all yield the same product; but those which in the fire show their differences by containing different substances, are here considered as being mixed with heterogeneous bodies: that small quantity of earthy substance, which all phlogista leave behind in the fire, is, however, not attended to.

I. Inflammable air; fire damp.

This aeriform substance is easily known by its property of inflaming when mixed with twice or thrice its bulk of common atmospheric air; and it is asserted to be the real phlogiston almost pure. See *AEROLOGY-Index*, and *INFLAMMABLE Air*.

It admits considerable varieties, according to the nature of the substances from which it is produced, and often gives different residuums upon combustion, some of which are of the acid kind. If it is produced from charcoal, it yields aerial acid or fixed air: from solutions of metallic substances in the vitriolic, nitrous, or marine acids, it yields these respective acids, as M. Lavoisier asserts.

Æther, converted into vapour in a vacuum, gives a permanent elastic vapour, which is inflammable. The atmosphere, which floats round the fraxinella, is inflammable from the admixture of its vapours, which seem to be of the nature of an essential oil: so that on approaching the flame of a candle under this plant, in hot weather, it takes fire in an instant; although the essential oil, extracted from this plant by distillation, is not inflammable on account of the watery particles mixed with it, as M. Bomare asserts.

Mr Scheele is of opinion, that every inflammable air is composed of a very subtle oil. This coincides with the idea entertained by chemists of their phlogiston; and is confirmed by the fact, of its being naturally found in those springs from whence issues petrol, whose exhalations are very inflammable.

The residuum, which remains in the atmosphere after the combustion of inflammable air, is extremely noxious to animals. Doctor Priestley takes it to be a combination of phlogiston with pure air, and on this account calls it *phlogisticated air*. But M. Lavoisier, on the contrary, considers it to be a primitive substance of an unchangeable nature, and gives it the singular name of *atmospheric mephitis*.

II. Hepatic air.

This air seems to consist of sulphur, held in solution in vitriolic or marine air. It is inflammable when mixed with three quarters of its bulk of common air. Nitre will take up about half the bulk of this air; and when saturated

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mables.

with it, will turn silver black: but if strong dephlogisticated nitrous acid be dropped into this water, the sulphur will be precipitated.

One hundred cubic inches of this air may hold eight grains of sulphur in solution in the temperature of 60°; and more, if hotter.

Atmospheric air also decomposes hepatic air.

It is found in many mineral waters, and particularly in the hot baths of Aix-la-Chapelle. The cause and manner of their containing sulphur, which was long a problem, has at last been happily explained by Mr Bergman.

It plentifully occurs in the neighbourhood of volcanoes and in several mines.

Hepatic air is easily obtained by art, from all sorts of liver of sulphur, whether the base be an alkali, an earth, or a metal, if any acid is poured upon it; and the better, if use be made of the marine acid, because it contains phlogiston enough, and does not so strongly attract that of the *hepar sulphuris*. For this reason the nitrous acid is not fit for this process, as it combines itself with the phlogiston, and produces nitrous air. It may also be produced, by distilling a mixture of sulphur and powdered charcoal, or of sulphur and oil, &c. See the detached article *HEPATIC Air*, and *AEROLOGY-Index*.

III. Phlogiston combined with aerial acid; black lead, or wadd. *Plumbago*. See the detached article *Black-LEAD*.

It is found,

- a. Of a steel-grained and dull texture. It is naturally black, but when rubbed it gives a dark lead colour.
- b. Of a fine scaly and coarse-grained texture; coarse black-lead.

IV. Mineral tallow. *Serum minerale*.

This was found in the sea on the coasts of Finland in the year 1736. Its specific gravity is 0.770; whereas that of tallow is 0.969. It burns with a blue flame, and a smell of grease, leaving a black viscid matter, which is with more difficulty consumed.

It is soluble in spirit of wine only when tartarised: and even then leaves an insoluble residuum; but expressed oils dissolve it when boiling.

It is also found in some rocky parts of Persia, but seems mixed with petrol, and is there called *schebennaad*, *tshienpen*, *kodreti*.

Dr Herman of Strasburg mentions a spring in the neighbourhood of that city, which contains a substance of this sort diffused through it, which separates on ebullition, and may then be collected. (*Kirwan*).

V. Ambergris. *Ambra grisea*.

It is commonly supposed to belong to the mineral kingdom, although it is said to have doubtful marks of its origin (A).

a. It

(A) Ambergris, according to the assertion of M. Aublet (in his *Histoire de la Guiane*), is nothing more than the juice of a tree inspissated by evaporation into a concrete form. This tree grows in Guyana, and is called

Infam-
mables.

- a. It has an agreeable smell, chiefly when burnt :
- b. Is consumed in an open fire :
- c. Softens in a slight degree of warmth, so as to stick to the teeth like pitch.
- d. It is of a black or grey colour ; and of a dull or fine grained texture (B).

The grey is reckoned the best, and is sold very dear. This drug is brought to Europe from the Indies. It is employed in medicine ; and also as a perfume (c).

VI. Amber. *Ambra flava, succinum, electrum*, Lat. *Carabé*, French. *Agtslein, Bernstein*, Germ.

This substance is dug out of the earth, and found on the sea-coasts. According to the experiments of M. Bourdelin, it consists of an inflammable substance, united with the acid of common salt, which seems to have given it its hardness.

It is supposed to be of vegetable origin, since it is said to be found together with wood in the earth.

By distillation it yields water, oil, and a volatile acid salt, which the above mentioned author has thought to be the acid of common salt united with a small portion of phlogiston.

Insects, fish, and vegetables, are often found included in it, which testify its having once been liquid.

It is more transparent than most of the other bitumens ; and is doubtless the substance which first gave rise to *electrical experiments* (on account of the power it possesses of attracting little bits of straw, or of other light substances, when rubbed).

Its varieties are reckoned from its colour and transparency. It is found,

A.

called *cuma*, but has not been investigated by other botanists. When some branches are broken by high winds, a large quantity of the juice comes out ; and if it chances to have time to dry, various masses (some of which had been so large as to weigh 1200 pounds and more) are carried into the rivers by heavy rains, and through them into the sea : afterwards they are either thrown into the shore or eaten by some fish, chiefly the spermaceti whale, known by the name of *Phyfeter-macrocephalus* among ichthyologists. This kind of whale is very greedy of this gum-resin, and swallows such large quantities when they meet with it, that they generally become sick ; so that those employed in the fishery of these whales, always expect to find some amber mixed with the excrements and remains of other food in the bowels of those whales who are lean. Various authors, among whom is Father Santos in his *Ethiopia Orientalis*, who travelled to various places of the African coast, and Bomare, say, that some species of birds are fond of eating this substance as well as the whales and other fishes. This accounts very well for the claws, beaks, bones, and feathers of birds, parts of vegetables, shells, and bones of fish, and particularly for the beaks of the cuttle fish or *sepia octopodia*, that are sometimes found in the mass of this substance. Dr Swedjar, however, attended only to these last, though he had mentioned also the other substances in his paper inserted in the Philosophical Transactions for 1783 ; wherein he attempts to establish an opinion, that the amber is nothing else but a preternaturally hardened dung, or feces, of the phyfeter whale. Dr Withering and Mr Kirwan have embraced this notion ; as did also, inadvertently, the editors of this Work. See AMBERGRIS.

(B) Mr Aublet brought specimens of this gum-resin, which he collected on the spot, from the *cuma* tree at Guiane. It is of a whitish-brown colour with a yellowish shade, and melts and burns like wax on the fire. The singularity of this gum-resin is, that it imbibes very strongly the smell of the aromatic substances which surround it ; and it is well known that perfumers avail themselves very considerably of this advantage. M. Rouelle examined very carefully this substance brought over by Mr Aublet, and found that it produced the very same results as in other good kind of amber. Besides Mr Aublet's authority, which is decisive, as being grounded upon direct proofs of fact, Rumphius, quoted by Bergman, long since mentioned a tree called *Nanarium*, whose inspissated juice resembles amber. It cannot therefore at present be doubted that the origin of this phlogistic substance is the vegetable kingdom, although it may be often found and reputed as a product of the fossil kind.

This substance being analysed by Messrs Geoffroy and Newman, quoted by M. Fourcroy, yielded them the same principles as the bitumens ; viz. an acid spirit, a concrete acid salt, some oil, and a charry residuum ; which evidently evinces, that all these fat and oily fossil substances have their origin from the other two kingdoms of nature.

(c) Ambergris is not only brought from the East Indies, but from the coasts of the Bahama Islands, Brasil, Madagascar, Africa, China, Japan, the Molucca islands, the coasts of Coromandel, Sumatra, &c. Dr Lippert, in a treatise he published at Vienna in 1782, entitled *Phlogistologia Mineralis*, has copied chiefly from Wallerius what he asserts of this substance. He affirms that there are eight known species of amber ; five of a single colour, viz. the white and the black from the island of Nicobar, in the gulph of Bengal, the ash-coloured, the yellow, and the blackish ; and two variegated, viz. the grey coloured with black specks, and the grey with yellow specks. This last he asserts to be the most esteemed on account of its very fragrant smell, and to come from the South coast of Africa and Madagascar, as well as from Sumatra ; and that the black dark coloured amber is often found in the bowels of the cetaceous fishes. The same author adds also from Wallerius, that by distilling the oil of yellow amber (*succinum*) with three parts and a half of fuming nitrous acid, a residuum remains like rosin, which emits a perfect smell of musk ; whence some conclude, that the ambergris belongs to the fossil kind : the contrary, however, is evinced in the preceding note.

Inflam-
mables.

A. Opaque.

a. Brown.

b. White.

c. Blackish.

B. Transparent.

a. Colourless.

b. Yellow.

The greatest quantity of European amber is found in Prussia; but it is, besides, collected on the sea-coast of the province of Skone, and at Biorko; in the lake Malaren in the province of Upland; as also in France and in Siberia. It is chiefly employed in medicine and for making varnishes (D).

VII. Rock-oil.

This is an inflammable mineral substance, or a thin bitumen, of a light brown colour, which cannot be decomposed; but is often rendered impure by heterogeneous admixtures. By length of time it hardens in the open air, and then resembles a vegetable resin; in this state it is of a black colour, whether pure or mixed with other bodies. It is found,

A. Liquid.

1. Naphtha.

This is of a very fragrant smell, transparent, extremely inflammable, and attracts gold. It is collected on the surface of the water in some wells in Persia. See NAPHTHA.

2. Petrol.

This smells like the oil of amber, though

more agreeable; and likewise very readily takes fire. It is collected in the same manner as the Naphtha from some wells in Italy. See PETROLEUM.

B. Thick and pitchy; *Petroleum tenax*. Barbadoes-tar.

This resembles soft pitch.

It is found at the Dead Sea in the Holy Land; in Persia, in the chinks of rocks, and in strata of gypsum and limestone, or floating on water; also in Siberia, Germany, and Switzerland, in coal-pits; and in America: likewise in Colebrookdale in England.

C. Elastic petrol.

This is a very singular fossil, found of late in England.

By its colour and consistency, it exactly resembles the Indian-rubber, or the gum-resin, from the north part of Brasil, called *caoutchouc*. It is of a dark brown colour, almost black; and some is found of a yellowish brown cast, like the same gum-resin.

With respect to its elastic consistence, it hardly can be distinguished from it, except in the cohesion of its particles, which is weaker.

It has the same property of rubbing off from paper the traces of black-lead pencils.

It burns likewise with a smoky flame; and also melts into a thick oily fluid; but emits a disagreeable smell, like the fossil pitch, or Barbadoes tar.

It

(D) Amber, says M. Fourcroy, is found in small detached pieces, for the most part under coloured sands, dispersed in beds of pyritaceous earth; and above it is found wood, charged with a blackish bituminous matter. Hence it is strongly supposed that it is a resinous substance, which has been altered by the vitriolic acid of the pyrites, notwithstanding that we know that acids, when concentrated, always blacken and charry resinous substances. In fact, the chemical analysis of this substance rather confirms that supposition.

The singular opinion of Dr Girtanner, about the yellow amber being produced by a kind of ants, may be seen in *Journal de Physique* for March 1786, page 227. Or see the article AMBER in this Dictionary.

The colour, texture, transparency, and opacity of this substance, have shown some other varieties besides these mentioned in the text. The principal ones are the following:

6. The yellow succinum,

7. The coloured green or blue by foreign matter,

8. The veined succinum,

9. The white,

10. The pale-yellow,

11. The citron-yellow,

12. The deep-red,

opaque.

transparent.

The golden yellow transparent amber, mentioned in the text, is what the ancients called *chrysoletrum*, and the white opaque was called *leucolettrum*.

But we must be cautious about the value of the specimens remarkable for their colour, size, transparency, and the well-preserved insects they contain internally; since there is a probability of deception, several persons possessing the art of rendering it transparent and coloured, and of softening it, so as to introduce foreign substances, &c. into it at pleasure.

M. Fourcroy says, that two pieces of this substance may be united, by applying them to one another, after being wet with oil of tartar and heated. And Wallerius mentions, that pieces of yellow amber may be softened, formed into one, and even dissolved by means of oil of turnip-seed, in a gentle heat; and that according to some authors, it may be rendered pure and transparent, by boiling it in rape-seed oil, linseed oil, salt-water, &c.

Mr Macquer says, that for the purpose of making varnish, this substance must undergo beforehand a previous decomposition by torrefaction, in order to be dissolved by linseed-oil or essential oils. See VARNISH.

Besides the making of varnishes, this substance was much employed formerly in making various pieces of ornament and jewellery. The best pieces were cut, turned, carved, or plained, to make vases, heads of canes, collars, bracelets, snuff-boxes, beads, and other toys, small fine chests, &c. But after diamonds and beautiful hard stones were brought into use, these trinkets are little considered in Europe: nevertheless, they are still sent to Persia, China, and to various other eastern nations, who esteem them still as great curiosities.

It is found in the same earthy and stony beds as petrol. Some specimens are of a cylindrical form, like bits of thin branches or stalks of vegetables, though much more flexible, being perfectly elastic.

M. Magellan observes, that this fossil seems to favour the opinion of those mineralogists, "who believe that these oily combustibles derive their origin from the vegetable kingdom. It seems worth trying, whether pieces of asphaltum, buried in damp beds of sparry rubbish, or other kind of earths, would take the same elastic consistence. But since many beds of shells and other fossil substances, both of the vegetable and animal kind, as impressions of various plants, and the remains of various quadrupeds, &c. have been found in different parts of the globe, whose individual species undoubtedly exist no longer alive unless in far distant climates, and in the most remote countries from the spot where their exuvia are dug out; why should we not allow that this new fossil may be the same original elastic gum, now growing naturally in Brasil, China, and other hot climates, only altered in its smell, and in the tenacity of its particles, by its long deposition during centuries in the bowels of the earth?"

This elastic petrol was found in 1785, near Casseltown, in the county of Derbyshire in England, but in very inconsiderable quantities.

D. Hardened rock-oil; fossil pitch. *Petroleum induratum, Pix montana.*

1. Pure asphaltum.

This leaves no ashes or earthy substance when it is burnt.

It is a smooth, hard, brittle, inodorous, black or brown substance. When looked through in small pieces, appears of a deep red colour. It swims in water.

It breaks with a smooth shining surface.—Melts easily: and, when pure, burns without leaving any ashes; but if impure, leaves ashes or a slag.

According to M. Monet, it contains sulphur, or at least the vitriolic acid.

It is slightly and partially acted on by alcohol and æther.

From this, or the preceding substance, it is probable the asphaltum was prepared that the Egyptians used in embalming their dead bodies, and which is now called *mumia*.

It is found also on the shores of the Red Sea, in the Dead Sea, in Germany, and France.—(*Kirwan.*)

And it comes likewise from Porto Principe, in the island of Cuba. (*Brun.*)

It is found also in many parts of China: and is employed as a covering to ships by the Arabs and Indians. (*Fourcroy.*)

2. Impure; *Pix montana impura*. Pissaphaltum.

This contains a great quantity of earthy matter, which is left in the retort after distillation, or upon the piece of charcoal, if burnt in an open fire; it coheres like a slag, and is of the colour of black-lead: but in a calcining heat, this earth quickly volatilises, so that the nature of it is not yet known.

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It is found in Mossgrufvan in Norberg, and in Grengierberget, both in the province of Westmanland; and also in other places.

The pissaphaltum is of a mean consistence between the asphaltum and the common petroleum. It is the very bitumen which is collected in Auvergne in France in the well called *de la Pege*, near Clermont Ferrand.

VIII. Jet. *Gagas, Succinum nigrum.*

This is a very compact bitumen, harder than asphaltum, always black, and susceptible of a good polish. It becomes electrical when rubbed; attracts light bodies like the yellow amber; and it swims on water.

It seems to be nothing else than a black amber, or succinum; but specifically lighter, on account of the greater portion of bitumen that enters into its composition. When burned, it emits a bituminous smell. See the article JET.

IX. Mineral phlogiston united with earths.

A. With calcareous earth.

1. With pure calcareous earth. This is the fetid or swine spar formerly described.

B. United with calcareous, argillaceous, ponderous, and siliceous earth and vitriolic acid. Liverstone: *Lapis hepaticus*.

C. With an argillaceous earth; Pit or Stone Coal.

1. With a small quantity of argillaceous earth and vitriolic acid. *Lithanthrax*. See the articles COAL and PIT-COAL.

This is of a black colour, and of a shining texture: it burns with a flame, and is mostly consumed in the fire; but leaves, however, a small quantity of ashes.

a. Solid coal. b. Slaty coal.

2. Culm-coal, called *kolm* by the Swedes.

This has a greater quantity of argillaceous earth and vitriolic acid, and a moderate proportion of petrol.

It has the same appearance with the preceding one, though of a more dull texture: it burns with a flame; and yet is not consumed, but leaves behind a slag of the same bulk or volume as the coal was.

From England, and among the alum rock at Moltorp and Billingen in the province of Westergottland.

3. Slate-coal.

This coal contains abundance of argillaceous earth. It burns with a flame by itself, otherwise it looks like other slates.

It is found at Gulleräsen in the parish of Rettwik, in the province of Dalarna, and also with the coals at Boserup in Skone.

This seems to be the same with the bituminous schistus, already described among the argillaceous earths.

4. Cannel-coal.

Mr Kirwan has put together this variety of coal with that other called *Kilkenny-coal*, tho' they have some different properties.

The cannel-coal is of a dull black colour; breaks easily in any direction; and, in its fracture, presents a smooth conchoidal surface, if broken transversely.

It contains a considerable quantity of petrol,

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in a less denser state than other coals; and burns with a bright lively flame, but is very apt to fly in pieces in the fire. It is said, however, to be entirely deprived of this property, by being previously immersed in water for some hours.

Its specific gravity is about 1270; and being of an uniform hard texture may be easily turned in the lathe, and receive a good polish.

It is from this kind of coal that small vases, as ink-stands, various trinkets, and other curiosities, are made in England, which appear as if made of the finest jet.

5. Kilkenny-coal.

This contains the largest proportion of petrol or asphaltum; burns with less flame and smoke, and more slowly, though intensely, than the cannel-coal.

The quantity of earth in this coal does not exceed one twentieth of its weight. Its specific gravity is about 1400. It is frequently mixed with pyrites.

It is found in the county of Kilkenny, belonging to the province of Leinster in Ireland. The quality of this coal burning almost without smoke, is mentioned in a proverb by which the good qualities of this county are expressed.

6. Sulphureous coal.

This consists of the former kinds of coal, mixed with a notable proportion of pyrites: hence it is apt to moulder and break when exposed to the air. It contains yellow spots that look like metal; and burns with a sulphureous smell, leaving either red ashes, or a slag, or both. Water acts upon it, after it has mouldered. Its specific gravity is = 1500, or more.

Besides the above varieties, schistus, micaceous schistus, and gneiss, are frequently found in the neighbourhood of coal-mines, so penetrated with petrol bitumen as to constitute an inferior species of coal; but the bitumen being burnt, they preserve their form, and in some measure their hardness. Also some grey slates, that are so soft as to be scraped with the nail, and are greasy to the touch, burn like coal.

All the differences of coal arise from a mixture of the varieties already mentioned; and it is observable, that wherever coals exist, slates are generally found near them. Salt or mineral springs are also often found in their neighbourhood. (*Kirwan.*)

7. Bovey coal. *Xylanthrax.*

This is of a brown, or brownish black colour, and of a yellow laminar texture.

The laminæ are frequently flexible when first dug, though generally they harden when exposed to the air.

It consists of wood penetrated with petrol or bitumen; and frequently contains pyrites, alum, and vitriol.

Its ashes afford a small quantity of fixed al-

kali, according to the German chemists; but according to Mr Mills they contain none.

By distillation it yields an ill smelling liquor, mixed with a volatile alkali and oil, part of which is soluble in spirit of wine, and part infusible, being of a mineral nature.

It is found in England, France, Italy, Switzerland, Germany, Ireland, &c. (*Kirwan.*)

8. Peat. *Geanthrax.*

There are two sorts of inflammable substances known by this name, viz.

The first of a brown, yellowish brown, or black colour, found in moorish grounds; in Scotland, Holland, and Germany. When fresh, it is of a viscid consistence, but hardens by exposure to the air. It consists of clay mixed with calcareous earth and pyrites; and sometimes contains common salt. While soft, it is formed into oblong pieces for fuel, after the pyritaceous and stony matters are separated. When distilled, it affords water, acid, oil, and volatile alkali. Its ashes contain a small proportion of fixed alkali. They are either white or red, according as it contains more or less ochre or pyrites.

The second is found near Newbury in Berkshire. It contains but little earth; but consists chiefly of wood, branches, twigs, roots of trees, with leaves, grass, straw, and weeds. (*Kirwan.*)

9. Stone-turf.

Cronstedt has ranged the turf among the fossils of his Appendix; but as that called in England by the name of *stone-turf* contains a considerable proportion of peat, it may be mentioned with propriety in this class.

Soon after it is dug out from the ground, where it keeps a soft consistence, it at first hardens; but afterwards it crumbles by long exposure to the air.

As to the other common turf, it only consists of mould interwoven with the roots of vegetables; but when these roots are of the bulbous kind, or in a large proportion, they form the worst kind of turf.

Although it may appear incredible, it is nevertheless a real fact, that in England pit-turf is advantageously employed in Lancashire to smelt the iron-ore of that county. Mr Wilkinson, brother-in-law to Dr Priestley, and famous for his undertakings in the extensive iron-works, perhaps the greatest in Europe, makes use of pit-turf in his large smelting furnaces of that province.

THOSE fossil substances, which furnish fuel for the various purposes of human life, are distinguished by the name of *coals*, on account of their being a succedaneum for wood and other vegetable productions, which when dry or of an oleaginous kind serve for the same uses. If these vegetable substances are deprived of the access of air, by covering them after ignition, the half-consumed remainder, which is of a black colour, is called by the name of *coal* or *charcoal*; and from hence the fossil which affords fuel has

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also been called by the same name, though of a very different nature.

Pit-coal and earth-coal are synonymous, and mean coals dug out of a pit or from the earth. But the lithanthrax denotes stone-coal, and more properly indicates the cannel-coal, which has the greatest similarity to a stony substance, by the dull appearance of its fracture and by the uniform texture of its parts.

All these coals are in general a bituminous black or brown and dark substance: for the most part they have a lamellated texture, which breaks easily, and always with a shining surface.

The varieties of pit-coals above-mentioned are the most remarkable, by which they may be distinguished from one another. But they are far from being homogeneous in each kind; as the accidental qualities, and the various proportions of their component parts, produce a far greater number of properties, which renders them more or less fit for different purposes; though these are generally overlooked, and confounded with the common one of affording fuel for making fire to warm our rooms, or for culinary operations.

This fossile bitumen, as Fourcroy remarks, being

heated in contact with a body in combustion, and a free access of air, kindles the more slowly, and with more difficulty, as it is more weighty and compact. When once kindled, it emits a brisk and very durable heat, and burns for a long time before it is consumed. If extinguished at a proper time, the remaining cinders may serve several times for a new firing with a small addition of fresh coals. The matter that is burned, and produces the flame, appears very dense, as if united to another substance which retards its destruction. Upon burning, it emits a particular strong smell, which is not at all sulphureous when the earth-coal is pure, and contains no pyrites.

When the combustible, oily, and most volatile parts, contained in the earth-coal, are dissipated and set on fire by the first application of heat; if the combustion is stopped, the bitumen retains only the most fixed and least inflammable part of its oil, and is reduced to a true charry state, in combination with the earthy and fixed base. Pit-coals in this charry state are called *coaks*, which are capable of exciting the most intense heat; and are employed all over Britain in the smelting of iron, copper, and other metallic ores, to the greatest advantage. See COAKS, COAL, COAL-ERY, and PIT-COAL (E).

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X. The

† Nat. Hist.
of the Mi-
neral King-
dom.

(E) The coal-metals, or stone strata inclosing coals, are very numerous. Mr Williams† gives the following general account of those in Scotland.

The sand-stones. Of these there is a great variety, distinguishable by colour, texture, and degrees of hardness, generally disposed into thick, middling, and thin strata. The only species our author takes notice of is the regular broad-bedded free-stone of a laminated texture. This commonly rises in thin or middling strata; appearing at the edges of a section, when broken or cut, to be formed of thin lamina or layers of sand, equally laid on the whole breadth of the stone, and well cemented together. A great deal of both red and white free-stone rise in layers of five or six inches, and so upwards, with regular streaks of a fifth or sixth part of an inch appearing the whole length of the stone, when the edge of a slab is polished, as if so many gentle waves of water had formed the layer. The regularity of the structure of this stone corresponds exactly with the regularity of its layers; and our author is of opinion, that the flaggy grey-strata of free stone, with many of the black and grey-strata of coal metals, the grey slate, as well as many other thin strata of the coal metals, may be ranked with this free stone for perfect and regular stratification.

Along with these he classes some of the thin argillaceous strata. "Many of the grey regularly stratified mountain limestones (says he) are also streaked or striped; and the streaks in these appear more conspicuous when broken than the streaked free stones. Some of the hard regularly stratified mountain rocks are also stratified; and in all these three kinds of stones, the streaks are regularly and exactly parallel to the bed of the stone."

Another remarkable instance of regularity of strata is met with in the grey flaggy strata of Caithness.—Throughout all the low country of Caithness, a square of about 10 or 15 miles, there are bluish argillaceous strata, with generally a small quantity of lime in the composition of the stone, which is indurated to a greater degree than is common to such thin strata. The stone is strong and tough, every where disposed in thin broad-bedded, regular strata; and in several parts of the country the flags are so thin and regular, and are raised so light and broad, that they are used for covering houses; and three or four of them will cover the side of a small one. Our author mentions a gentleman who has an estate on the south side of the Pentland frith, and who in a bay there raises flags of any size and thickness he pleases; "so truly flat and smooth, that he has only to square the edges to make of them good loft-floors, partitions, chests, mangers, roofs of houses; in short, he does every thing with them. The face of these flags are as smooth and true a plane, as if artificially finished by the best workman."

In most coal fields there are a great variety of strata of different kinds accompanying and lying between the seams of coal, of all sorts of colours, consistencies, and dimensions; all of them blended together without any certain order or regularity; so that if there be 20 seams of coal, it is possible that there may be as many different roofs; that is, the stratum which is the immediate roof of one seam of coal, shall differ from that of another seam in quality, thickness, and colour, so that perhaps no two of the twenty shall be in any respect alike.

The various kinds of coal-roofs (a) commonly met with are the following.

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(a) The stratum which is placed immediately above a seam of coal, is called the *roof* of the coal; and that which is placed immediately below the seam, is called the *pavement* of the coal: which three, viz. the stratum of coal, and its roof and pavement, with the other concomitant strata lying above and below them, always preserve their stations and parallelism; that is, are all stretched out and spread one above another upon the same inclining plane, and have the same line of bearing and of declivity.

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X. The mineral phlogiston or bitumen, united with the vitriolic acid : sulphur or brimstone. See the article SULPHUR.

This is very common in the earth, and discovers itself in many and various forms. It is found,

A. Native. *Sulphur nativum*.

In this the two constituent parts are mixed in due proportion in regard to each other, according to the rules of that attraction which is between them. It is easily known,

1. By its inflammability, and by its flame.
2. By its smell when burnt; and,

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3. By

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1. *Basalt*. This is very common in Scotland, where it is frequently called *whin* stone; and at Borrowstounness there are several thick beds of it between the seams of coal. One of them being the immediate roof of a seam of coal there at Hillhouse lime quarry, there is a thin seam of coal beneath a beautiful bed of columnar basalt. In the Bathgate hills to the southward of Linlithgow, also, there are several strata of coal blended with those of basalt. These basaltine strata are always very hard, frequently very thick, and generally of a black or blackish grey colour. "There are but few people (says Mr Williams) sufficiently versed in natural history, to know that they are basalt, as this kind of rock, both in England and Scotland, goes by the name of *whin* rock. In the north of Scotland it is called *skurdy*; and among the miners in Cornwall it has the name of *cockle* (b)."

2. Strata of *limestone* of various thicknesses are met with in different coal-fields. Sometimes the lime is the immediate roof; but sometimes there is an argillaceous stratum of about the thickness of a foot between the coal stratum and that of lime. In the coal-fields at Gilmerton, near Edinburgh, are several beds of limestone, some of them very good, and of considerable thickness. At Blackburn in West Lothian, also, there is a stratum of limestone six or seven feet thick, which is the immediate roof of a seam of coal about five or six feet thick. At Carlisle and Spittlehaugh in Tweedale, they have a seam of coal immediately below their lime quarries, which they work for burning their lime.

3. *Post-stone*, a kind of thick and solid stratum of free stone, is one of the roofs of coal, generally without the intervention of any argillaceous stratum, though sometimes a stratum of this kind is interposed. Frequently this kind of stone is rendered very hard by a mixture of iron or pyrites. In most coal fields, thinner strata of free stone are met with as the roofs of coal seams.

4. *Dogger-band*, as it is called by the Scots colliers, is frequently met with as the roof of coal seams. This name is applied to various substances. Sometimes they call strata of iron-stone *dogger bands*; sometimes the name is restricted to the ball iron-stone; sometimes to pyrites; and sometimes the dogger band is a kind of imperfect stone, composed of several heterogeneous mixtures, among which pyrites bears a considerable proportion, and by which the whole is so strongly bound together, that it is frequently very difficult to break through it.

5. *Whin-stone*, properly so called, not of a basaltic nature. These roofs are always very hard, and of various colours, as black, blackish grey, brown, red, &c. sometimes not above two or three feet in thickness, but sometimes much more.

6. *Post-stone*, of a softer nature than that already mentioned. This has no mixture of ferruginous matter.

7. *Regular strata of free-stone*, of various colours, textures, and thicknesses, but not sufficiently thick to deserve the name of *post-stone*, which our author thinks they do not, unless they are above three or four feet. These thin strata of free stone are very numerous in coal fields, and very frequently form the roofs of coal seams. Some of them are three or four feet thick, while others do not exceed three or four inches. They make good roofs, easily cut through, and may be readily quarried out for other purposes.

8. *Grey-bands*, or grey-coloured free-stone, frequently form the roofs of coal seams. A great number of them are generally arranged in one place, lying immediately above one another; and they are frequently found of all degrees of thickness from one to twenty inches, though the most common dimensions are from two to six. By the Scots colliers these are called *grey fikes* as well as grey bands. Frequently they are found of moderate hardness, and sufficiently strong to make good flags and covers for sewers. These roofs are strong and safe when the stone partakes of the nature of the coal, and has a black or blackish grey colour; but when they have a mixture of tilly or argillaceous matter, they are more friable.

9. *Blaes*, when hard, strong, and well stratified, are reckoned tolerably good coal-roofs. These are always of a bluish-black or black-grey colour, and are of great variety in respect to hardness and strength. Some of the strongest and hardest are either entirely black or greyish black; while some of the different shades of black are pretty thick, and others are but thin. The thickest, however, are not above 18 inches, and the thinnest two or three inches or less. The medium thickness is from one foot to three or four inches. Some of them are sufficiently hard to make a good and safe coal-roof; but they seldom acquire such a degree of hardness as to give any considerable obstruction in sucking. All of them seem to have a considerable quantity of black argillaceous matter in their composition; and the strong blaes have also a considerable quantity of sand; often also containing a large portion of empyreumatic oil, and sometimes have a considerable mixture of coaly matter. There is a great variety both in the thickness and quantity of these blaes found above seams of coal. In some places the thinnest strata make the immediate roof; in others, the thickest. Sometimes we find only five or six inches of blaes upon the coal; in others as many fathoms, or even much more; and it is common to find them of all the intermediate thicknesses.

10. *Whitish*.

(b) We must observe, however, that according to Bergman and other eminent mineralogists, the *cockles* or *shirls* ought not to be confounded with *basalt*; which last name does not at all fit those substances. See *Volcanic Products* in the Appendix to this article.

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3. By its producing a liver of sulphur, when mixed with a fixed alkali, like that made from artificial sulphur. It is found,

a. Pellucid, of a deep yellow colour.

b. Opaque, white, and greyish.

These are found in Siberia, at Beviex in Swisserland, and at Salfatara near Naples.

c. Crystallised in octoedral prisms, with blunted points.

d. Transparent. Mr Davila had been informed that this was brought from Normandy in France. (*Brun.*)

1. Native sulphur is found in different forms, viz. either in solid pieces of indeterminate figure, running in veins through rocks; or in small lumps, in gypsum and lime-stones; in considerable quantities at Solfatara, and in the neighbourhood of volcanoes; or crystallised in pale, transparent, or semitransparent, octogonal, or rhomboidal crystals, in the cavities of quartz; and particularly in the matrices of ores; or in the form of small needles over hot springs, or near volcanoes (*Kirwan*).

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10. *Whitish and ash-coloured argillaceous strata*, of middling strength, are frequently found to be the immediate roofs of coal. Some of these are of middling thickness, others thin. They are commonly found from two inches to two feet in thickness. A great many of these roofs are very dangerous on account of their fragility; while others are quite safe, owing to the more perfect formation of their strata, or to some ingredient in their composition.

11. *Streaked roofs*. These are of two sorts: 1. Such as are composed chiefly of sand, with a very small mixture of clay and blaes; and, 2. Those composed principally of clay or blaes with a small quantity of sand. Some of these have large, others small, streaks or ribs. Mr Williams says that he has seen them so beautifully streaked as to resemble the finest striped cotton stuffs. These stripes or streaks always lie exactly parallel to one another, as well as to the bed of the stone, and are always spread out the whole breadth of the stratum. Their colours are various in different strata, some of the stripes being nearly black and white, others white and red, and others yellow and red. In some the stripes appear of a lighter and darker grey colour. Some of the finely striped stones have their streaks about a quarter of an inch in diameter; sometimes less: and it is common to see stripes from a quarter to three quarters of an inch broad; but in the finely striped stones it is rare to find them a full inch thick without some different shade on one side or other of the stripe. The second kind of these streaked roofs, viz. such as are composed of blaes, with a smaller mixture of sand, differ but little from the former; only the colours are not always so bright, nor the stripes so fine; neither is the roof quite so hard.

12. *The soft blaes roofs* sometimes consist of pretty thick strata; others of such as are thin or of middling thickness. There are likewise arrangements or classes of regularly stratified blaes, found immediately above seams of coal, from three or four inches to several fathoms in thickness, though some are even met with little exceeding one inch in thickness; though in the same place there might be a considerable thickness of blaes above the coal, taking in all the different strata, thick and thin, which lay above it. Some of these roofs have an oily appearance on the outside, and through all the fissures and joints of the strata; that is, they appear smooth and glossy, and are very slippery to the touch. Others have no appearance of this kind; but all of them are tender, weak, and fragile, so that they make a very indifferent and dangerous roof.

13. Another kind of coal-roof consists likewise of blaes, but such as are *imperfectly stratified*. It is altogether the same in quality and colour as the last, the only difference that can be distinguished being in the different degrees of stratification. The beds of this kind are not perfect, but unequal; whence it is a bad and dangerous roof, as great pieces of it are frequently apt to fall down by reason of the inequality and different joints of the strata. Some of these blaes appear in thick, and others in thin or middling thick beds; while some have an oily smoothness, called by the Scots colliers *creefby* (greasy) blaes. It is owing to this oiliness particularly that these kinds of roofs are so dangerous; for the oil pervades the joints, and, rendering them slippery, makes the pieces more apt to fall out as soon as the coal is worked away from below them. Some of these have such a quantity of natural oil, that they will flame a little in the fire; and in some places there are hard blaes which will burn when fire is set to them, though they will not consume. At Pitsfirran in Fifeshire there is a species of this blaes so inflammable, that when fire is set to one corner of a hillock it will burn throughout the whole; nevertheless it is not reduced in bulk by this combustion, nor does it produce any ashes. Instead of this it becomes considerably harder than before, and acquires a pale red colour. By reason of its hardness, it is proper for being laid upon horse and foot paths, but is not so for roads over which heavy wheel-carriages pass.

14. *Soft blaes not stratified at all*. Of these there is no more than one bed from two or three inches to several fathoms in thickness, without any others either above or below it. They are as common as any above the coal seams; but their substance is not always uniform throughout the whole stratum. Some of them are found divided into small angular masses, and others into larger ones; but whether these are uniform or not, they always make a bad and dangerous roof. These argillaceous strata are sometimes called *beds of till*; the uniform sort are called *dauk*, and the glebous kind *lipey* blaes, by the Scots colliers. Both the uniform and glebous soft blaes frequently contain a quantity of ball iron-stone, though some of it contains none at all. The regular continuous strata of iron-stone are commonly found in stratified soft blaes. There is a variety of soft coal-roofs of a grey colour, and of which some are regularly stratified, and some not.

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- Sometimes it is formed in old privies : of this Mr Magellan saw some lumps that were found in a very old one at Paris.
2. United with clay in the aluminous ore of La Tolfa, and also at Tarnowitz in Silesia. This last resembles a light grey earth : when dry, bursts or cracks in the water like marl ; and possesses a strong peculiar smell like camphor. If distilled, the sulphur sublimes. One hundred parts of this earth afford eight of sulphur, besides gypsum and a quantity of iron.
 3. Mixed with clay, iron, and selenite. This compound is of a grey, brown, or black colour, found near Rome, Auvergne, Spain, and Iceland.

4. With limestone in the form of a calcareous hepar. This is found at Tivoli, near Rome, and elsewhere in Italy. It is sometimes dissolved in mineral waters, three pounds of which contain as much as 25 grains of sulphur. It often forms incrustations on the brinks of these springs.
5. In the form of an alkaline hepar. This is said to be found in some waters in Russia ; as will be hereafter noticed.
6. United to iron and clay of pyrites, &c. of which hereafter.
7. United to metallic substances, as hereafter specified.

B. Saturated with metals (F).

1. With iron. Pyrites, or copperas-stone ; *Pyrites.*

15. *Regularly soft grey coal-roofs.*—Of these there are several sorts. Some have a considerable quantity of sand in the composition of the strata ; and many of these are as regularly stratified as any coal-metals whatever. Numbers are found very thin, and others of middling thickness ; though in all cases they are so tender and friable, that they make very bad and dangerous roofs. Some of them indeed look pretty well at first but they soon crumble and come down, especially when they have been exposed to the air. This, in the opinion of Mr Williams, is owing partly to their having too much clay in their composition, and partly to the want of a sufficient quantity of natural cement to connect the several particles of the stone together.

16. *Soft grey regular strata*, or grey bands of an argillaceous kind ; and of these there is likewise a considerable variety. Some are of a dark, others of a lighter grey ; some thick, others thin : they are very numerous in coal-fields, and are frequently to be found as the immediate roofs of coal. These, as well as the black kinds, are found in all quantities or degrees of thickness above different coals, from a few inches up to several fathoms ; but whether they be in great or small quantity, the roof they compose is generally very frail and tender.

17. *Soft grey argillaceous bands, imperfectly stratified.* These differ little or nothing in substance from the former ; the only difference is in the stratification. Many of the strata of the former are of a middling thickness, or rather thin, finely and regularly spread out, and every part of each stratum of an equal thickness. But this sort, though it has the appearance of strata, is clumsy and irregular ; that is, the several beds are unequal, and divided by many irregular joints into unequal misshapen masses, which makes this a very bad roof ; the masses being apt to separate at the joints, and to fall down when the coal is worked out from below them.

18. *Soft grey argillaceous beds of metal or coal roofs not stratified at all.* These are of two kinds, viz. 1. such as are found broken or formed in the stratum into glebes or masses ; and, 2. such as are found in one uniform mass throughout the whole bed, without any division into masses or strata. These grey soft roofs are of all degrees of thickness, from a few inches up to many fathoms, as well as the black ; and there is but very little difference between them in any respect excepting the colour. But in this, as well as in the black unstratified blaes, and that both in the glebous and uniform beds, ball or glebous iron-stone is frequently found ; and strata of iron-stone are also found in the stratified soft grey blaes.

19. *White and ash-coloured soft argillaceous coal-roofs ;* and of these there is also a great variety. Some of this kind are regularly stratified, others imperfectly, and some not at all. Some of the whitish argillaceous roofs are compounded of gritty sand and clay ; others appear to be chiefly composed of pure clay ; and some of a loamy clay. Those which are regularly stratified and mixed with sand, either coarse or fine, are of great variety with regard to thickness and the arrangements of the strata ; but all of them are tender and fragile, and thus make very troublesome and dangerous roofs.

20. *Whitish argillaceous roofs, stratified*, and of a homogeneous quality, or not mixed with sand. Some of these are finely and perfectly stratified, and are of different degrees of hardness ; but in general, make but a weak roof. Some of them are found in irregular strata, with all the other varieties and imperfections already mentioned.

21. *White and ash-coloured argillaceous coal-roofs, not stratified at all.* Sometimes these are found in very thick beds in the coal-fields ; and some of these, as well as of the black soft roofs, rise in glebes and masses of different sizes ; while others are homogeneous throughout the whole bed, however thick, from two or three inches to several fathoms. Some of these beds of white argillaceous marle-like matter are found to be a sandy or loamy clay ; others a pure homogeneous clay, which does not feel gritty between the fingers nor in the mouth. The shades and varieties of this kind are as numerous as those of any of the foregoing ; and all of them, by the Scots colliers, are called *dauk*, whatever be their colour. Mr Williams informs us, that he has frequently taken some of these fine white clays to wash his hands, and has found them answer almost as well as soap.

(F) Sulphur is the most common mineraliser of metals ; and therefore most of its combinations with those substances fall to be ranked hereafter among the metallic ores.

rites. This is the substance from which most sulphur is prepared, and is therefore ranked here with all its varieties. It is hard, and of a metallic shining colour.

A. Pale yellow pyrites; *Pyrites subflavus*. Marcasite. This is very common, and contains a proportionable quantity of sulphur with respect to the iron; when once thoroughly inflamed, it burns by itself.

a. Of a compact texture; *Polita piedra del yuca, Hispanorum*.

b. Steel-grained.

c. Coarse-grained.

d. Crystallised. It shoots mostly into cubical and octoedral figures, though it also crystallises into innumerable other forms.

B. Liver-coloured marcasite. Its colour cannot be described, being betwixt that of the preceding marcasite and the azure copper ore. The iron prevails in this kind; it is therefore less fit to have sulphur extracted from it, and also for the smelting of copper ores. It is found,

a. Of a compact texture.

b. Steel-grained.

c. Coarse-grained.

C. Various combined with iron and other metallic substances.

1. With iron and copper; forming yellow or marcasitical copper ore.

2. With iron, silver, and lead; potters lead ore.

3. With iron and zinc; mock lead, black jack or blende.

4. With iron and arsenic; arsenical pyrites.

5. With iron and cobalt.

6. With iron and bismuth.

7. With iron and nickel.

8. With iron and gold; pyritical gold ore.

9. With silver; glass silver ore.

10. With copper; grey or vitreous copper ore.

11. With lead; potters lead ore.

12. With bismuth.

13. With quicksilver; cinnabar.

14. With arsenic; orpiment, realgar.

XI. Mineral phlogiston mixed with metallic earths.

This is not found in any great quantity: in regard to its external appearance, it resembles pit-coal; and the fat substance contained in it, at times, partly burns to coal, and partly volatilises in a calcining heat.

The only known varieties of this kind are,

A. *Minera cupri phlogistica*.

When it has been inflamed, it retains the fire, and at last burns to ashes, out of which pure copper can be smelted.

B. *Minera ferri phlogistica*.

This is not very different in its appearance from the pit-coal or foffile pitch, but it is somewhat harder to the touch. There are two varieties of this species:

1. Fixed in the fire; *Minera ferri phlogistica fixa*.

Exposed to a calcining heat, it burns with a very languid though quick flame; it preserves its bulk, and loses only a little of its weight. It yields above 30 per cent. of iron.

a. Solid, which resembles black sealing-wax.

b. Cracked, and friable.

2. Volatile in the fire.

This is unalterable in an open fire, either of charcoal, or even upon a piece of charcoal before the flame of the blow-pipe; but under a muffle the greatest part of it volatilises, so that only a small quantity of calx of iron remains. It is found,

a. Solid.

b. Cracked.

This last kind leaves more ashes: these ashes, when farther exposed to the fire, become first yellowish-green, and afterwards reddish-brown; when, besides iron, they then also discover some marks of copper: it has, however, not been possible to extract any metallic substance from them, the effects of the loadstone, and the colour communicated to the glass of borax, having only given occasion to this suspicion.

CLASS IV. METALLIC SUBSTANCES.

METALS are those minerals which, with respect to their volume, are the heaviest of all known bodies. Some of them are malleable; and some may be decomposed; and, in a melting heat (G), be brought back again to their former state by the addition of the phlogiston they had lost in their decomposition. See METALLURGY, Part I. Sect. i. and CHEMISTRY-Index at *Metallic Calces* and *Metals*.

All the metallic substances contain phlogiston; and when, to a certain degree, deprived of it, fall into a powder like an earth; but their attractions for phlogiston are different.

Most of them, when melted in a common way, and exposed to the air, have an earthy crust formed upon the surface, which cannot again be reduced to metal without the addition of some inflammable matter. The base metals have this property.

But the noble metals, viz. platina, gold, and silver, are so firmly united to the phlogiston, that they never calcine under fusion, however long continued; and, after being changed into a calx in the liquid way, when melted in the fire, they reassume their metallic form without any other phlogiston than what is contained in the matter of heat.

Quick-

(G) The various degrees of heat required to reduce metals to a fluid state, are seen in the following table, which was extracted, for the most part, by Dr Withering, from the printed treatises of the late celebrated Professor Bergman. It exhibits, in a simple view, 1. The specific gravity of each metal; 2. The degree of heat by Fahrenheit's scale, in which it melts; 3. The quantity of phlogiston it requires for its saturation; and,

METALS.

Quicksilver holds a kind of middle place: for, like the base metals, it may be calcined, though not readily; and, like the noble ones, it may be reduced by heat alone.

We may therefore reckon four noble or perfect metals; viz. gold, platina, silver, and mercury; because, when calcined, they recover their phlogiston without the addition of any phlogistic substance.

But as tin, lead, copper, and iron, cannot be reduced without such addition, these are called *ignoble* and *imperfect* or *base* metals. *Kirwan's Mineralogy.*

However, all those eight metals (even mercury, when solid) are malleable to a considerable degree, and are called *entire* metals. But

Bismuth, zinc, antimony, arsenic, cobalt, nickel, manganese, molybdena, and wolfram, are scarce at all malleable, and hence they are called *femimetals*. Nevertheless, zinc and purified nickel are more malleable than any of the other femimetals; so that we have four perfect or noble metals, four imperfect or base, eight entire, and nine femimetals (H).

Order

4. Its attraction to the same saturating phlogiston. We must, however, observe, that if the second column be compared with that of Wedgwood's thermometer, their great disagreements betray some fundamental error in the assumed data: for the degrees of heat assigned by Mr Wedgwood for melting gold, silver, and copper, are more than quadruple of those assigned by Bergman, and that for melting iron is more than eleven times greater; although they both nearly agree in the red heat of iron, which Bergman says to be 1050 degrees, and Wedgwood 1077. Mr Magellan is of opinion, that the fault lies in Mortimer's thermometer, which Bergman quotes with some diffidence (Sect. 197. of his *Sciagraphia*); and thinks it probable, that the changes caused by heat, on this metallic thermometer, are in a much less increasing proportion by intense fire, than those indicated by the contraction of the pure clay, happily employed by Wedgwood in his thermometer. He therefore added another column to this table, marked *Wedgw.* with the degrees of the melting heats already ascertained by this last thermometer, as being the nearest to truth.

METALS.	Specific Gravity.	Melting Heat.	Melting Heat.	Saturating Phlogiston.	Attraction to saturating Phlogiston.
		Berg.	Wedgw.		
Gold	19,640	1301	5237	394	1 or 2
Platina	21,000			756	1 or 2
Silver	10,552	1000	4717	100	3
Quicksilver	14,110	—40	—40	74	4
Lead	11,352	595		43	10
Copper	8,876	1450	4587	312	8
Iron	7,800	1601	17977	342	11
Tin	7,264	415		114	9
Bismuth	9,670	494		57	7
Nickel {common}	7,000	1301		156	11
{pure}	9,000	1601		109	5
Arsenic	8,308				
Cobalt {common}	7,700	{ 1450			
{pure}		{ 1601			
Zinc	6,862	699		182	11
Antimony	6,860	809		120	6
Manganese	6,850	Very great		227	11

N. B. By saturating phlogiston, Professor Bergman means to express the proportionate quantities taken away from each metallic substance, when dissolved by means of acids, and of course reduced to a calciform state. The last column only expresses their attraction to this part of their phlogiston, not to that which still remains united to them in a calciform state. *Withering.*

(H) Mr Mongez remarks, that the following are the general properties of metals, when considered as physical bodies; viz. their opacity, great specific gravity, ductility, tenacity, crystallization, flavour, and even smell, at least in some of them.

It is from their density that their gravity and opacity proceed; this last being such, that, even reduced to the thinnest plates, no rays of light can pass through their particles, unless there remains an interstice or pore quite free from the metallic substance. Gold leaf must, however, be excepted, which exhibits a fine green by transmitted light.

As to their crystallization, it has been found to take place whenever they are pure, and left to cool very slowly by themselves, after having been perfectly fused. (See *Journal de Physique* for July 1781, p. 74.) The flavour and smell above mentioned are very perceptible in the reguline substances of arsenic and antimony, as well as in lead, copper, and iron.

All metals are conductors of electricity; and more perfectly so than any other bodies during their union with phlogiston.

They

Order I. NOBLE OR PERFECT METALS.

I. Gold; *Aurum sol chymicorum*. See the articles GOLD; also CHEMISTRY-Index; and METALLURGY, Part II. sect. 1.

This is esteemed the principal and first among the metals; and that partly for its scarcity, but chiefly for the following qualities:

1. It is of a yellow shining colour.
2. It is the heaviest of all known bodies, its specific gravity to water being as 19,640 to 1000.
3. It is the most tough and ductile of all metals; because one grain of it may be stretched out so as to cover a silver wire of the length of 98 yards, by which means $\frac{1}{105600}$ of a grain becomes visible to the naked eye.
4. Its softness comes nearest to that of lead, and consequently it is but very little elastic.
5. It is fixed and unalterable in air and water, and is indestructible by the common action of fire.

N^o 223.

6. When melted, it reflects a bluish-green colour from its surface.

7. It dissolves in aqua-regia, in the dephlogisticated marine acid, and also (according to Crell †) in an acid obtained by distilling vitriolic acid from off manganese.

8. When mixed with a volatile alkali and a little of the acid of nitre, by means of precipitation out of aqua-regia, it burns off quickly, in the least degree of heat, with a strong fulmination.

9. It is dissolved, *in forma sicca*, by the liver of sulphur, and also somewhat by the glass of bismuth (1).

10. It is not carried away by the antimony during the volatilisation of that semi-metal, and is therefore conveniently separated from other metals by the help of crude antimony; in which process the other metals are partly made volatile, and fly off with the antimony, and partly unite with the sulphur, to which the gold has no attraction, unless by means of some uniting body, or by a long digestion (κ).

11. The

They are soluble either in nitrous acid and in dephlogisticated marine acid, or in aqua regia; and are precipitable in some degree by caustic alkalies; and except platina by the Prussian alkali.

When dephlogisticated, they communicate a tinge to borax and to microcosmic salt, or at least render them opaque.

They assume a convex surface when melted, and even a globular form, if in a small quantity; and though they mix for the most part with one another whilst fused, yet they refuse to unite with unmetallic substances, even their own calces, iron only excepted, which does to its own calx slightly dephlogisticated and to plumbago. Nickel also, and some others, may contain sulphur in their reguline state.

Metals, when calcined, are capable of uniting with other calces and salts.

Three of the metallic calces have been found to be of an acid nature; viz. the arsenical, molybdenic, and tungstenic; from which, by analogy, the nature of other calces may be conjectured.

The phlogiston contained in metals is in a pure state; viz. without water and aerial acid, with which it is invariably accompanied in all other compounds except acid airs and sulphur.

When metallic substances are naturally found in the earth united to their full share of phlogiston, and consequently possessing their peculiar properties, they are called *native*.

But when they are found more or less deprived of their phlogiston and of their properties, combined with other substances, they are then called *mineralised*. This is the most common state of the mineral kingdom. The substance so combined with them is called the *mineraliser*, and the whole is called *ore*; by which name are also distinguished these earths and stones in which metallic substances are contained.

But if both metallic substances are mixed together in their metallic or reguline form, without the loss of phlogiston, they are then said to be alloyed.

When the mineraliser is of a saline nature, and renders the metallic combination soluble in less than 20 times its weight of water, the compound is ranged among salts. Thus the vitriols of iron, copper, and zinc, are rather classed with salts than with ores.

The most common mineralisers are, sulphur, arsenic, and fixed air or aerial acid. The least common are the vitriolic and the marine acids. The phosphoric has been found only in two instances; viz. united to lead, discovered by Gahn; and to iron, in the siderite, as Mr Meyer believes.

Those metallic substances, mineralised by aerial acid, are called *calciform ores*.

M. Magellan observes, that if the new doctrine of the French chemists, who assert, that calces of metals are a compound of dephlogisticated or vital air with the metallic substance, were just, all calciform ores should produce this vital air instead of aerial acid, when they are reduced to their metallic form; which is not the case: neither should all the base metals and semimetals absolutely require the mixture of some phlogistic substance in order to their being reduced from the state of calces to their metallic form, which otherwise would be quite useless, if their reduction simply consisted in their separation from the vital or dephlogisticated air.

(1) Neither sulphur nor fixed alkali has any action on gold; but the liver of sulphur, which is a compound of both, can dissolve it in the dry way; so that if a proper quantity of gold-leaves be put in a crucible together with liver of sulphur, and it be melted in a brisk fire, the gold is thoroughly dissolved; and if the whole be diluted in water, the gold will be kept in the solution, and even pass through the filtre along with it.

(κ) Antimony is used also to refine gold from its alloy, as it attenuates and carries off all other metallic substances

Perfect
METALS.
Gold.

11. The phosphorus is said to have ingreſs into gold (L).
 12. If mixed with a leſs portion of ſilver, platina, copper, iron, and zinc, it preſerves tolerably well its ductility. But,
 13. When mixed with tin, it becomes very brittle; and it attracts likewiſe the ſmoke of that metal, ſo as to be ſpoiled if melted in an hearth where tin has been lately melted (M).
 14. It requires a ſtrong heat before it melts, nearly as much or a little more than copper.
 15. It mixes or amalgamates readily with quickſilver. See METALLURGY, Part II. ſect. i. (N).
 16. It is not diſſolved by the glaſs of lead, and therefore remains on the cupel.
- A. Native gold. With reſpect to the figure or the quantity in which gold is found in one place, it is by miners divided into,
1. Thin ſuperficial plated or leaved gold; which conſiſts of very thin plates or leaves, like paper.
 2. Solid or maſſive, is found in form of thick pieces.
 3. Cryſtalliſed, conſiſts of an angular figure.
 4. Waſh gold, or gold duſt, is waſhed out of ſands, wherein it lies in form of looſe grains and lumps (O). See other diſtinctions of form under the article GOLD.
- B. Mineraliſed gold. This is an ore in which the gold is ſo far mineraliſed, or ſo entangled in other bodies, as not to be diſſolved by the aqua-regia.

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Perfect
METALS.
Silver.

1. Mineraliſed with ſulphur by means of iron. Marcaſitical gold-ore; *Pyrites aureus*.
 2. By means of quickſilver. It is found in Hungary.
 3. By means of zinc and iron, or ſilver. The Schemnitz blende.
- See other varieties of mineraliſed gold ores under the detached article GOLD, already referred to.

II. Silver: *Argentum, Luna*. See the article SILVER. See alſo CHEMISTRY-Index; and METALLURGY, Part II. ſect. iii. and Part III. ſect. iii.

This metal is,

- a. Of a white ſhining colour.
- b. Its ſpecific gravity to water is, according to Cronſtedt, as 11,091 to 1000; according to Bergman, = 10,552; and according to Kirwan, 11,095.
- c. It is very tough or ductile, ſo that a grain of it may be ſtretched out to three yards in length and two inches in breadth.
- d. It is unalterable in air, water, and fire.
- e. It diſſolves in the acid of nitre, and alſo by boiling in the acid of vitriol.
- f. If precipitated out of the acid nitre with the common ſalt, or with its acid, it unites ſo ſtrongly with this laſt acid, that it does not part from it, even in the fire itſelf, but melts with it into a maſs like glaſs, which is called *luna cornea* (P).

P

3. It

ſubſtances mixed with it, without excepting the ſilver; whiſt lead leaves this laſt behind, and even adds ſome of its own to the gold. *Pauſſon*, p. 659.

(L) Gold, reduced into thin leaves, is not acted upon by the phosphoric acid in the humid way, though the fire be urged till luminous decrepitations take place; but when it paſſes that point which ſeparates the humid from the dry way, Mr Margraaf obſerved that ſome purple ſcoria were formed, which is an indication that this concrete acid had partly calcined the gold during its fuſion. *Elements de Chymie de Dijon*, Vol. III. p. 131.

Befides this, a drop of the phosphoric acid on the ſolution of gold by aqua-regia precipitates the metal in its revived ſtate, as aſſerted by the academicians of Dijon. *Magellan*.

(M) The fumes of a ſingle grain of tin are capable of rendering hard eight ounces of gold; but it eaſily recovers its malleability by being melted on the fire. (*Wallerius* and *Bomare's Mineralogy*.) But when gold is mixed with aſſenic, cobalt, nickle, biſmuth, or with the regulus of antimony, it only loſes great part of its malleability; and when in a certain proportion, it may be calcined and vitrified with them.—(*Fabroni*.)

(N) Bergman doubts if ever gold has been found perfectly pure; and Mr Kirwan ſays that it is very ſeldom found ſo, being generally alloyed with ſilver, copper, or iron, or all three. As to the gold commonly uſed in toys and other objects of luxury, every one knows that it is purpoſely debaſed by the artiſts with copper or other metals; and of late it has been employed in various pieces of jewellery, to form ornaments of various colours: thus a great alloy of ſilver (viz. one-third part), gives it a ſhade of a green colour; a ſimilar quantity of copper, a reddiſh one; a mixture of aſſenic, or filings of ſteel, in the proportion of one-fourth part, gives it a bluſh caſt; ſo that having the yellow naturally in the pure gold, and the white in pure ſilver, the jewellers have almoſt all the colours to diverſify their work. Even in the currency of money, there is none coined out of pure gold, which, by common agreement, is called *gold of 24 carats*. The gold coin of England, France, and Portugal, only contains 22 parts of pure gold, and two of alloy, viz. it is only 22 carats, in the common ſaying: that of Spain is but of $21\frac{1}{2}$ carats: but the ducat of Holland is of $23\frac{1}{4}$ carats; and the zecchino of Venice, of $23\frac{1}{2}$ carats: which laſt therefore, it would ſeem, is the pureſt gold coin of Europe. (*Pauſſon's Metrologie*.)

(O) M. Daubenton, in his Methodical Tables of Minerals, enumerates eight ſorts of native gold, viz. 1. In powder; 2. In grains; 3. In ſmall ſpangles; 4. In maſſes of lumps; 5. In filaments; 6. In branches like vegetables; 7. In lamella; and 8. In octoedraſl cryſtals.—He obſerves alſo, that gold, in its reguline ſtate, is formed, either, 1. Into angular cryſtals, compoſed of yellow octoedres; or, 2. Into irregular yellow maſſes, which, being broken, ſhow a granular ſubſtance.

(P) The marine acid attracts the calx of ſilver, but cannot remove its phlogiſton; and therefore cannot diſſolve

- g. It does not unite with the semi-metal nickel during the fusion.
- h. It amalgamates easily with quicksilver.
- i. It is in the dry way dissolved by the liver of sulphur.
- k. It has a strong attraction to sulphur, so as readily to take a reddish yellow or black colour when it is exposed to liver vapours.
- l. It has no attraction to arsenic; whence, when the red arsenical silver ore, or *rothgulden ertz* of the Germans, is put into the fire, the arsenic flies off, and leaves the sulphur (which in this compound was the *medium uniens*, behind, united with the silver in form of the glass silver ore, or glass ertz.
- m. It is not dissolved by the glass of lead, and consequently it remains on the cupel.
- n. It is exhaled or carried off by volatile metals and acids; as by the vapours of antimony, zinc, and the acid of common salt.
- o. According to Cronstedt, it melts more easily than copper; and this was a general opinion. But the contrary, as Mr Magellan remarks, has been proved by means of the nice thermometer lately invented by Wedgwood.— See THERMOMETER.
- Silver is found,
- A. Native or pure; which most generally is nearly of 16 carats standard (Q.)
1. Thin, superficial, plated or leaved.
 2. In form,
 - a. Of snaggs, and coarse fibres.
 - b. Of fine fibres. Capillary silver.
 - c. Arboresecent.
 - d. Crystalline or figured. This is very rare: it has distinct fibres, with shining surfaces.
- B. Mixed or alloyed with other metals.
- The following are the known instances of these mixtures:
1. United to gold, (*Bergman's Sciagraphia*, § 154.)
 2. Mixed with copper; (*Berg. Sc.* § 155.)
 3. United to gold and copper; (*Berg. Sc.* § 156.)
 4. Amalgamated with mercury, found in the mines of Salberg; (*Foster's notes to Brunnich*.)
 5. United to iron; (*Berg. Sc.* § 157.)
 6. United to lead, sometimes in such quantities as to be worth the expences attending the separation.
 7. United to arsenic; (*Journal de physique*, 1778, p. 50.)
 8. United to antimony; (*Berg. Sc.* § 159.)
 9. Joined to the regulus of arsenic and iron; (*Berg. Sc.* § 160.)
 10. Mixed with the alkaline limestone from

Annaberg, described by Mr Justi; (*Brunnich*.)

11. Sandy silver-ore, without any metallic shining.
 12. Silver-ore in a red-brown schistus, described by Lehman: it is composed of argillaceous earth, micaceous hematites, sulphur, calcareous spar, fluor mineralis, lead, and silver.— It contains about seven or eight ounces of silver on the hundred weight.
 13. Soft silver-ore. It is found among the marles and argillaceous earths; and is of various colours, either singly or mixed.
- C. Dissolved and mineralised.

(1.) With sulphur alone. Glass silver-ore.

This is ductile, and of the same colour as lead; but, however, becomes blacker in the air. It has therefore, though very improperly, got the name of *glass-ore*; for that name rather belongs to the *minera argenti cornea*, or horn silver ore, if indeed any silver ore can be considered as glassy.

It is found,

1. In crusts, plates, or leaves.
2. Grown into
 - a. Snaggs, and
 - b. Crystalline figures.

It is generally either of a lamellar or a grained texture.

The glass silver ore is the richest of all silver ores; since the sulphur, which is united with the silver in this ore, makes but a very small quantity of its weight.

(2.) Arsenico-martial silver ore, (*Weill ertz*, Germ.)

This ore contains silver and iron mineralised by arsenic; the arsenic in a larger proportion than the iron. This is the *Pyrites argenteus* of Henckel.

1. It is a hard substance, of a white shining appearance, and of a compact, lamellar, or fibrous texture. (*Kirwan*, sp. 7.)
2. Of a yellowish white colour, and of a striated structure, resembling bismuth, but much harder. (*Kirwan*, sp. 3.)—It is found near Guadanal canal in Spain.
3. Near the same place is found also another ore of the same kind, which is very soft and easily cut; and when cut, has a brilliant metallic appearance. It consists of conchoidal laminæ. The quintal contains only from four to six ounces of silver; but it is easily reduced by evaporating the arsenic, which then leaves the silver slightly contaminated with iron. (*Kirwan*, sp. 4.)

(3.) With

dissolve it in its metallic state, (*Bergman*.) However, the marine acid, if well concentrated, or rather reduced into an aerial form, dissolves silver in its metallic state, (*Fabroni*.)

Mr Scheele, and after him Mr Bertholet, assert positively, that the marine acid, being dephlogisticated by its distillation over manganese in the form of a yellow air or gas, dissolves all the metals, without excepting gold, silver, or mercury. See Scheele's Essay 5. § 25. H.

The vitriolic acid being distilled also over the manganese, dissolves silver, gold, and mercury, as Dr Crell asserts, (*Journal de Physique*, Oct. 1785, p. 297.)

Silver is precipitated from the vitriolic and nitrous acids by the marine; and from the nitrous, in great measure, by the vitriolic, (*Kirwan*.)

(Q) Wallerius distinguishes seven species of silver: (see the article SILVER). Daubenton reckons eight varieties of native white silver, arising from their peculiar forms.

- (3.) With sulphur and arsenic. The red or ruby-like silver ore. The *rothgulden* of the Germans.

The colour of this ore varies as the proportion of the ingredients varies in the mixture, viz. from dark grey to deep red; but when it is rubbed or pounded, it always gives a red colour.

- a. Grey arsenical silver ore.
1. Plated, crufted, or leaved.
2. Solid.
b. The red arsenical silver ore:
1. Plated, crufted, or leaved;
2. Solid or scaly.
3. Crystallised (R.)

In this last form it shows the most beautiful red colour, and is often semi-transparent. It contains about 60 per cent. in silver.

- (4.) With sulphur, little arsenic, and iron.— (*Schwartz ertz*, *Schwartz gulden*, *Silber mulm*. Germ.)

This is a friable, weathered, decayed ore.

- a. Of a black or sooty colour; and is therefore called by the Germans *silberschwartz*, or *ruffigtes-ertz*.

- (5.) With sulphurated arsenic and copper. The *weissgulden* of the Germans.

This, in its solid form, is of a light grey colour, and of a dull and steel-grained texture. Its proportion of silver is from 10 to 30 per cent.

- (6.) With sulphurated arsenic and iron. The *weisertz*, or white silver ore of the Germans.

This is an arsenical pyrites, which contains silver; it occurs in the Saxon mines, and so exactly resembles the common arsenical pyrites, as not to be distinguished from it by sight alone, or without other means.

- (7.) With sulphurated antimony.

- a. Of a dark grey and somewhat brownish colour; the *laberetz* of the Germans.
b. Of a blackish blue colour.
1. In form of capillary crystals. *Federertz*, or plumose silver ore.

- (8.) With iron, arsenic, and cobalt, mineralised by sulphur.

This ore looks like the *weissgulden* described above; but is distinguished by the rose coloured particles of cobalt, dispersed through dark brown, blackish, or grey, and sometimes shining solid mass. It is to this species of ores that the silver goose dung ore belongs.

- (9.) With sulphurated copper and antimony.— The *Dal fab-ertz*.

This resembles both in colour and texture the

dark-coloured *weissgulden*. When rubbed, it gives a red powder.

- a. Solid.
b. Crystallised.

- (10.) With sulphurated zinc. The *pechblende* of the Germans.

This is a zinc ore, mock lead, or blende, which contains silver, and is found among rich silver and gold ores.

- a. Of a metallic changeable colour.
1. Solid, and with fine scales.
2. In form of balls. The *kugel-ertz*, or ball ore.
b. Black mock lead, or blende, found in Saxony. This is also found,
1. Solid, and with fine scales;
2. And in form of balls.

- (11.) With sulphurated lead; potters ore. *Galenæ*; *bleyglanz*.

- (12.) With sulphurated lead and antimony, called *striperz*.

- (13.) With sulphurated iron. *Silberhalitgier kies*; marcasite holding silver.

- (14.) With sulphurated and arsenical cobalt; dendrites being sometimes found in the stone. These kinds keep well in water; but generally wither in the air, and lose the silver they contain.

- (15.) Mineralized by sulphur, with regulus of antimony and barytes. The butter-milk ore. This is found in the form of thin particles, on granular spar, (*Kirwan*, sp. 13.)

- (16.) Combustible silver ore.

This is a black and brittle substance, and leave about 6 per cent. of silver in its ashes. It is in fact a coal in which silver is found. (*Kirwan*, sp. 14.)

- (17.) With the acid of common salt. *Minera argenti cornea*. *Hornetz*, or horn-silver ore.

This is the scarcest silver ore; it is of a white or pearl colour, changeable or varying on the surface, semi-transparent, and somewhat ductile both when crude and when melted. It cannot be decomposed without some admixture of such substances as attract the acid of sea-salt.

III. Platina del Pinto; *Juan blanca*.

This metal is a recent discovery of our times; and is described with great accuracy by Scheffer, in the Acts of the Royal Academy of Sciences at Stockholm for the year 1752; as also by Dr Lewis, in the Philosophical Transactions for the year 1754, vol. xlviii. and by many other writers. By these descriptions we are convinced of the resemblance this metal bears to gold; and therefore we must allow it to be called *white gold*. It has, however, a variety of distinguishing qualities

P 2

(R) Wallerius mentions the six following varieties of this notable ore in his *Species* 388, viz. 1. The red opaque, like cinnabar, from Andreasberg in the Hartz, and from Salberg in Westmannia: 2. The bluish, from Freiberg and Annaberg: 3. The grey, from Freiberg and Andreasberg: 4. The red transparent amorphous, of the garnet colour, from Potosi and Joachimsthal: 5. The red transparent, crystallised into prismatic decaedres, or dodecaedres, from Hungary, Alsace, and the Duchy of Deuxponts: 6. The only superficially red ore, from Salberg and Ehrenfriederichsdorf.

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Quicksilver.

lities besides its colour, which ascertain its peculiar nature : All which, with its history, uses, &c. are particularly described under the detached article PLATINA. See also CHEMISTRY-Index; and METALLURGY, Part II. sect. ii.

1. It is of a white colour.
2. It is so refractory in the fire, that there is no degree of heat yet found by which it can be brought into fusion by itself, the burning-glass excepted. But, when mixed with other metals and semimetals, it melts very easily, and especially with arsenic, both in its metallic form and in form of a calx or glass.

IV. Quicksilver, mercury. *Hydrargyrum, Argentum vivum, Mercurius*. See the article QUICKSILVER; CHEMISTRY-Index, at *Mercury*; and METALLURGY, Part II. sect. viii.

Mercury distinguishes itself from all metals by the following qualities (s.)

- a. Its colour is white and shining, a little darker than that of silver.
- b. It is fluid in the cold, and divisible by the least

force; but, as it only sticks to a few bodies to which it has an attraction, it is said that it does not wet.

- c. It is volatile in the fire.
- d. It attracts the other semimetals and metals; and unites with them all except cobalt and nickel, with which it cannot by any means yet known be made to mix. This union is called *amalgamation*. This amalgamation, or mixture of metallic bodies, according to the readiness with which they unite or mix, is in the following progression, viz. gold, silver, lead, tin, zinc, bismuth, copper, iron, and the regulus of antimony; the three latter, however, do not very readily amalgamate. The iron requires a solution of the vitriol of iron, as a medium to promote the union.
- e. It dissolves in spirit of nitre, out of which it is precipitated by a volatile alkali, and common salt, in form of a white powder; but if a fixed alkali is used, a yellow powder or calx is obtained (τ).

f. But

(s) It were almost superfluous, says Mr Kirwan, to mention any other character of quicksilver than its liquidity, to distinguish it from other metals. In regard to this property, Bergman observes, that mercury constitutes one extreme among the metals, and platina the other; since it requires to be melted only such a degree of heat as is rarely wanting in our atmosphere, and boils at the 6000 degrees nearly after lead melts. See the table at p. 111. *Note*. But when the cold is increased to the temperature denoted by 40 degrees below 0 both of Fahrenheit's and of the Swedish thermometer, which both coincide in that point (since $212 - 32$, or $180 : 100 :: 32 + 40$, or $72 : 40$), this metal concretes like any other metal, and becomes quite solid; (see Philosophical Transactions for 1783, p. 303.) Mercury in its common state, therefore, according to Bergman (*Treatise of Ele& Attr&*), is to be considered as a metal in fusion: and since in its solid state it is nearly as malleable as lead, it by no means ought to be placed among the semimetals, otherwise every other entire metal should be considered as brittle, for none is malleable when in fusion.

(τ) 1. Mercury is dissolved with great rapidity by nitrous acid: the liquor is of a greenish-blue colour, but loses it afterwards and becomes limpid. This solution, when made without heat, is used as a test for the analysis of mineral waters, and has different properties from that made with the help of heat. In the first case, says Bergman, very little phlogiston is lost, and the salt easily crystallises, being white, and scarcely acrid. It is not precipitated by distilled water; but by caustic vegetable alkali, it is precipitated of a yellowish colour; by mild alkali, the precipitation is white; by mineral alkali, it is yellow, but it soon grows also white; by volatile alkali, it turns to a greyish-black colour; by Glauber's salt, or by pure vitriolic acid, the precipitation is white, granulated, and in a small quantity; nor, if this precipitant has been sparingly used, does this colour appear in less than an hour: by muriatic acid, or common salt, the precipitation is also white, but in a large quantity, and in curdles.

2. But if the mercurial solution be put over a sand-heat, it may be charged with a quantity of mercury equal almost to its weight. According to the chemists of Dijon, 10 ounces of nitrous acid may dissolve eight of mercury. The action of the solvent becomes stronger with the heat; emits great quantity of vapours; and if not taken from the fire, will be too far evaporated. Distilled water will precipitate from this solution a white calx, because it is more dephlogisticated, and the solvent is overcharged with it; and the water changing the density of the liquor, diminishes the adhesion of the calx, as Fourcroy remarks. This white calx will turn yellow, if boiling water be poured on it. The vegetable alkali precipitates it of a brownish yellow, which by degrees assumes a pale-yellow tinge: the mild vegetable, and the mineral alkalies, produce nearly the same colour; though when this last is employed, the colour turns afterwards to white. The precipitation by volatile alkali is quite white also; that by the vitriolic acid is yellow; and, finally, a copious white mucilaginous matter is the precipitate by the marine acid.

3. This solution by nitrous acid is very caustic; corrodes and destroys animal substances; when it falls on the skin, stains it of a deep purple brown colour, which appears black: the stains do not go off before the separation of the epidermis, which falls away in scales or kind of scars. It is used in surgery as a powerful escharotic, and is called *mercurial water*.

4. The same solution, by cooling, is susceptible of forming crystals, which vary from one another according to circumstances: for the most part they are like needles; are very caustic; redden the skin; and detonate when put on burning coals, provided they be dry. They are called *mercurial nitre*, which fuses when heated in a crucible; exhales reddish fumes; assumes a deep yellow colour, which afterwards turns to orange, and

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- f. But it requires a boiling heat to dissolve it in oil of vitriol (v).
- g. It is not affected by the acid of common salt, unless it be previously dissolved by other acids (v); in which case only they both unite with one another, and may be sublimed together: this sublimate is a strong poison.
- h. It unites with sulphur by grinding; and then produces a black powder called *æthiops mineralis* (w), which sublimes into a red striated body called *factitious cinnabar*.
- i. The sulphur is again separated from the quicksilver, by adding iron or lime, to which the sulphur attaches itself, leaving the quicksilver to be distilled over in a metallic form; but if a fixed alkali be used, some part of the quicksilver will remain dissolved in the residuum, which is a liver of sulphur.
- Quicksilver is found,
- A. Native, or in a metallic state. *Mercurius natus, or virgineus*.
- This found in the quicksilver mines at Idra in Friuli, or the Lower Austria, in clay, or in a black stony *lapis ollaris*, out of which it runs, either spontaneously, or by being warmed even in the hands.
- B. United to gold or silver. *Hydrargyrum argenteo vel auro adunatum*.
- Mr Kirwan asserts, on the authorities of Monet

and Lin. Von Gmelin, that in Sweden and Germany mercury has been found united to silver in the form of a somewhat hard and brittle amalgam.

Romé de l'Isle had a specimen of this natural amalgam from Germany, which is imbedded in a quartzose mass, and mixed with cinnabar, as Mr Mongez asserts; and he adds, that in the royal cabinet, at the king's garden at Paris, is deposited another fine specimen of this mercurial ore, which was found crystallised in the mine called *Carolina* at Muehl-lansberg in the duchy of Deux Ponts. M. de l'Isle speaks also very positively of a specimen of native gold from Hungary, which seems to be a natural amalgam of gold and mercury. It is composed of quadrangular prisms, of a greyish yellow colour, and of a brittle texture. This specimen is also in the king's cabinet at the royal garden at Paris.

Mr Kirwan, speaking of the method of examining the purity of gold by the moist way, supposes, with Sir Torbern Bergman, that there are natural amalgamations of mercury with gold and silver: and Neumann observes, that sometimes a mineral, containing gold or silver, is met with among mercurial ores, although this is a great rarity.

It is evident, therefore, that there naturally exist

and at last to a brilliant red: in this state it is called *red precipitate*, or *arcanum corallinum*. It must be made in a matrass with a gentle heat if it is designed to be corrosive for surgical purposes.

(v) 1. The vitriolic acid, concentrated and boiling hot, seizes on mercury, and presently reduces it if urged by heat to a kind of white powder, which turns yellow by the affusion of hot water, but does not dissolve in it; this is called *turbith mineral*: but if cold water, instead of hot, was poured in the white mass, the powder would not change its white colour into yellow as was said above about the nitrous solution.

2. If Mercury be rarefied by heat into vapours, and these meet with those of marine acid in the same state, a corrosive sublimate will be formed. This metallic salt shoots into crystals pointed like daggers, which are the strongest of all poisons. But there are various other processes found in chemical authors to make this salt with more or less trouble. See CHEMISTRY, n° 814—818.

3. If corrosive sublimate be mixed with tin and distilled, a very smoking liquor is produced, called by the name of its inventor the *smoking liquor of Libavius*. See CHEMISTRY, n° 810.

The muriatic acid in the sublimate is not saturated, and from hence proceeds its great corrosive power; for if a fresh quantity of mercury be added to it, and sublimed a second or third time, a sweet, or mixed sublimate, called *mercurius dulcis*, is produced, which is not poisonous, and is given internally as a purgative, or an emetic, according to the dose. See CHEMISTRY, n° 819.

(v) Muriatic acid does not act upon quicksilver unless this last be previously deprived of as much phlogiston, as $\frac{74}{100}$ of the quantity contained in the hundred of silver, or of $\frac{80}{100}$ in the hundred of zinc. (See Bergman's *Sciagraphia*, and his treatise *De Phlogisti quantitate*.)

(w) The academicians of Dijon say, that the true proportion to make this æthiops, is that of one part of brimstone with four of mercury. Fourcroy directs only one of mercury, with three of flowers of sulphur, to be triturated, till the mercury is extinguished. A black powder is then produced, which is the æthiops mineral. The combination is better effected when the mercury is mixed with the fused sulphur: by agitating this mixture, it becomes black, and easily takes fire; it should be then taken from the fire, and the flame should be extinguished a little after, stirring the mass till it becomes into solid clots. If this substance be exposed to a great degree of heat, it takes fire, the sulphur is consumed, and a substance remains which is of a violet colour when pulverised. This powder being put into matrasses, till their bottom become red by the force of fire, is sublimed after some hours, and artificial cinnabar is found in the top of the vessels crystallised into brown red needles.

Mercury, divided by means of a rapid and continual motion, as that of a mill-wheel, gradually changes itself into a very fine black powder, which is called *æthiops per se*, on account of its colour, in order to distinguish it from this *æthiops mineralis* mentioned in the text.

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ist various ores of quicksilver, amalgamated with silver, gold, and other minerals, although they be but seldom met with.

C. Mineralised,

[1.] With sulphur.

A. Pure cinnabar, *Cinnabaris nativa*.

- a. Loose or friable cinnabar like red ochre.
- b. Indurated or solid cinnabar. It is of a deep red colour; and, with respect to its texture, is either,
 1. Steel-grained;
 2. Radiated;
 3. Composed of small cubes, or scaly; or
 4. Crystallised, in a cubical form; it is transparent, and deep red like a ruby.

B. Impure cinnabars.

1.) A mercurial ore is found in Idria, says Gellert, where the mercury lies in an earth or stone, as if it were in a dead form; and has the appearance of a red-brown iron-stone; but it is much heavier than that. It contains from three quarters to seven eighths of the purest mercury; leaves, after distillation, a very black strong earth behind; and gives some marks of cinnabar.

2.) Liver ore, which is most common in Idria, and has its name from its colour.—Outwardly it resembles an indurated iron-clay; but its weight discovers that its contents are metallic. It yields sometimes 80 pounds of quicksilver per hundred weight.

3.) Burning ore; *brand-erz* in German. This ore may be lighted at the candle; and yields from nine to 50 pounds of quicksilver per hundred weight. *Brunnich*.

[2.] With iron by sulphur. Pyritous cinnabar.

Sir Torbern Bergman inserted this ore in the 177th section of his *Sciagraphia*, and seems doubtful whether this be a distinct species from the cinnabar; as the iron is perhaps, says he, only mechanically diffused therein. Mr Mongez remarks, that there are but a few instances of cinnabar in which iron is not found in its calcined form; though, in the act of the ore being reduced, it passes to its metallic state, and becomes capable of being acted on by the loadstone.

Another pyritous ore of cinnabar was found at Menidot, near St Lo in Lower Normandy. It consisted in grains of different sizes, of a red brown colour: they had a vitriolic taste and sulphureous smell. Found also at Almaden in Spain, and at Stahlberg in the Pa-

latinate; though at this last place they are of a dodecaedral form.

[3.] With silver by the aerial acid, and sulphur.

This seems to be a native precipitate *per se*, or calx of mercury. It is said to have been lately found in Idria, in hard compact masses of a brownish-red colour; see *Journal de Physique* for January 1784, p. 61. If this account can be relied upon, it will prove, that quicksilver, even in a calciform state, is naturally found mineralised with silver by means of sulphur.

[4.] With sulphur and copper.

This ore is blackish grey, of a glassy texture, and brittle; crackles and splits excessively in the fire; and when the quicksilver and sulphur are evaporated, the copper is discovered by its common opaque red colour in the glass of borax, which, when farther forced in the fire, or diluted, becomes green and transparent. It is found at Muschlanberg in the duchy of Deux Ponts.

[5.] Mineralised by the marine and vitriolic acids.

Mineralogy owes the discovery of this ore to Mr Woulfe, who published an account of it in the Philosophical Transactions for 1776. It was found in the duchy of Deux Ponts, at the mine distinguished by the name of *Obermofchal*. It had a spar-like appearance. This ore is either bright and white, or yellow or black. It was mixed with cinnabar in a stony matrix: and being well mixed with one-third of its weight of vegetable alkali, afforded cubic and octagonal crystals; that is, salt of Sylvius and vitriolated tartar.

The marine salt of this mercury is in the state of sublimate corrosive.

Order II. IMPERFECT OR BASE METALS.

I. Tin. *Stannum*; *Jupiter*. (See the detached article TIN: Also CHEMISTRY-Index; and METALLURGY, Part II. sect. vi. and Part III. sect. vi.)

This is distinguished from the other metals by the following characters and qualities. It is,

- a. Of a white colour, which verges more to the blue than that of silver.
- b. It is the most fusible of all metals; and,
- c. The least ductile; that is, it cannot be extended or hammered out so much as the others (x).

d. In

(x) Tin is sufficiently ductile to be beaten into very thin leaves. But ductility and extensibility are two different properties, less connected with one another than is generally imagined. Iron and steel are drawn into exquisite fine wire, but cannot be beat into very thin leaves. Tin, on the other hand, is beat into fine leaves, and may be extended between rollers to a considerable surface. The tin-sheet used in various arts, is commonly about $\frac{1}{80}$ th part of an inch; but may be extended twice as much in its dimensions without difficulty. Notwithstanding this extensibility, tin cannot be drawn into wire, on account of the weak cohesion of its particles. A tin wire, however, of one-tenth of an inch diameter, is able to support a weight of $49\frac{1}{2}$ pounds, according to Fourcroy. Gold and silver possess both properties of ductility and extensibility the most eminently of all metallic bodies; whilst lead, notwithstanding its flexibility and softness, cannot be made either into leaves or wire of any fineness.

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Tin.

- d.* In breaking or bending, it makes a crackling noise.
- e.* It has a smell particular to itself, and which cannot be described.
- f.* In the fire it is easily calcined to white ashes, which are 25 per cent. heavier than the metal itself. During this operation, the phlogiston is seen to burn off in form of small sparkles among the ashes or calx.
- g.* This calx is very refractory; but may, however, with a very strong degree of heat be brought to a glass of the colour of colophony. But this calx is easily mixed in glass compositions, and makes with them the white enamel.
- h.* It unites with all metals and semimetals; but renders most of them very brittle, except lead, bismuth, and zinc.
- i.* It amalgamates easily with quicksilver.
- k.* It dissolves in aqua-regia, the spirit of sea-salt, and the vitriolic acid; but is only corroded into a white powder by the spirit of nitre. The vegetable acid, soaps, and pure alkaline salts, also corrode this metal by degrees.
- l.* Its specific gravity to water is as 7400 to 1000, or as 7321 to 1000.
- m.* Dissolved in aqua-regia, which for this purpose ought to consist of equal parts of the spirit of nitre and sea-salt, it heightens the colour of the cochineal, and makes it deeper; for otherwise that dye would be violet.

(1.) Native Tin.

The existence of native tin has long been questioned: but it has undoubtedly been found some years ago in Cornwall, as Mr Kirwan remarks.

- 1. Malleable tin, in a granular form, and also in a foliaceous shape, issuing out of a white hard matter like quartz: but which, after being properly assayed, proved to be arsenical crystals; a circumstance that evinces its being native tin, since the arsenic could not remain in this form if the tin had been melted. It appeared like a thick, jagged, or scolloped lace or edging; and was found near St Austle in Cornwall.
- 2. In the form of crystalline metallic laminæ, or laminated crystals, rising side by side out of an edging, which shone like melted tin: they were almost as thin as flakes or scales of talc, intersecting each other in various directions, with some cavities between them, within which appeared many specks and granules of tin, that could be easily cut with a knife: this was also found in Cornwall.
- 3. In a massy form, more than one inch thick in some places, and inclosed in a kind of quartzous stone; or rather in an hard crust of crystallised arsenic.

(2.) Calciform Ores of Tin.

A. In form of a calx, *Stannum calciforme*.

A. Indurated, or vitrified.

- 1. Mixed with a small portion of the calx of arsenic.

a. Solid tin ore, without any determinate figure. Tin-stone.

It resembles a garnet of a blackish brown colour, but is much heavier; and has been considered at the English tin-mines as a stone containing no metal, until some years ago it began to be smelted to great advantage.

B. Crystallised.

a. Tin spar, or white tin ore. This is generally of a whitish or grey colour; sometimes it is yellowish, semi-transparent, and crystallised, either of a pyramidal form, or irregularly.

b. Tin-grains. This ore, like the garnets, is of a spherical polygonal figure; but seems more unctuous on its surface.

1. In large grains.

2. In small grains.

B. Mixed with metals.

1. With the calx of iron, as in the garnet.

2. With manganese. See the *Semimetals*.

C. Mineralised.

1. With sulphur and iron.

2. With sulphur. *Aurum musivum*.

This was discovered by Professor Bergman, among some minerals which he received from Siberia. He observed two sorts of it, analogous to the two artificial combinations of tin with sulphur.

1. One nearly of the colour of zinc, and of a fibrous texture, which contained about 20 per cent. of sulphur, and the remainder tin.

2. The other enveloped the former like a crust; resembled aurum musivum; and contained about 40 per cent. of sulphur, a small proportion of copper, and the remainder tin. *Mem. Stockb. for 1721, p. 328.*

At Huel Rock, in St Agnes in Cornwall, there has been found a metallic vein, nine feet wide, at 20 yards beneath the surface. Mr Raspe was the first who discovered this to be a sulphurated tin-ore: it is very compact, of a bluish white colour, approaching to grey steel, and similar to the colour of grey copper ore: it is lamellar in its texture, and very brittle. It consists of sulphur, tin, copper, and some iron. Mr Raspe proposes to call it *bell-metal ore*.

According to Mr Klaproth's analysis of this ore, 119 grains contain 30 of pure sulphur; 41 of tin; 43 of copper; two of iron; and three grains of the stony matrix. In another specimen of the same sulphurated tin-ore from Cornwall, there were in the hundred 25 parts of sulphur, 34 of tin, 36 of copper, three of iron, and two of the stony matrix.

II. Lead; *Plumbum, Saturnus*. (See the article LEAD, and CHEMISTRY-Index: Also METALLURGY, Part II. sect. v. and Part III. sect. vii.)

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METALS.
Lead.

The properties of lead are as follows.

- a. It is of a bluish white colour when fresh broke, but soon dulls or sullies in the air.
- b. It is very heavy; viz. to water as 11,325 to 1000.
- c. It is the softest metal next to gold; but it has no great tenacity, and is not in the least sonorous.
- d. It is easily calcined; and, by a certain art in managing the degrees of the fire, its calx becomes white, yellow, and red.
- e. This calx melts easier than any other metallic calx to a glass, which becomes of a yellow colour, and semitransparent. This glass brings other bodies, and the imperfect metals, into fusion with it.
- f. It dissolves, 1st, In the spirit of nitre; 2dly, In a diluted oil of vitriol, by way of digestion; 3dly, In the vegetable acid; 4thly, In alkaline solutions; and 5thly, In expressed oils, both in the form of metal and of calx.
- g. It gives a sweet taste to all solutions.
- h. It amalgamates with quicksilver.
- i. With the spirit of sea-salt it has the same effect as silver, whereby is produced a *saturnus corneus*.
- k. It does not unite with iron, when it is alone added to it in the fire.
- l. It works on the cupel, which signifies that its glass enters into certain porous bodies, destitute of phlogiston and alkaline salts.
- m. It melts in the fire before it is made red-hot, almost as easily as the tin.
- n. Its calx or glass may be reduced to its metallic state by pot-ashes.

[1.] Native Lead.

For proofs of lead being naturally found in its metallic state, see the article LEAD.—It may be here added, that Henckel likewise affirms its existence, in his *Flora Saturnifans*; (see Kirwan's *Elements of Mineralogy*, p. 297, 298.) Wallerius asserts, that it has been so found in Poland, a specimen of which was kept in the collection of Richter; and adds, that a similar one found at Schneeberg, was seen in the collection of Spener. (*Mineralogy*, vol. ii. p. 301.)

Dr Lawson, in his English edition of Cramer's *Art of Essaying Metals*, says, that some pure native malleable lead had been lately found in New England; (p. 147.) And lastly, Professor Bergman did not hesitate to insert, by itself alone, the *plumbum nativum*, in Sect. 180. of his *Sciagraphia*.

[2.] Calciform Lead.

Lead is found,

A. In the form of a calx.

A. Pure.

- a. Friable lead ochre, native ceruse.
- b. Indurated lead spar, or spatose lead ore.
 - i. Radiated, or fibrous.
 1. White, from Mendip-hills, in England.
 - ii. Crystallised in a prismatic figure.
 1. White, from Norrgrufva in Westmanland.

2. Yellowish green, from Zschopau in Saxony.

B. Mixed,

1. With the calx of arsenic, arsenical lead spar.

2. Indurated.

a. White. Mr Cronstedt has tried such an ore from an unknown place in Germany, and found that no metallic lead could be melted from it by means of the blow-pipe, as can be done out of other lead spars; but it must be performed in a crucible. (See the article LEAD. par. iii.)

3. With a calcareous earth.

This ore effervesces with aqua-fortis, and contains 40 per cent. of lead; on which account it is placed here rather than among the calcareous earths.

B. Mineralised.

1. With sulphur alone: the *bley-schweiff*, or *bleyglanz*, of the Germans.

a. Steel-grained lead-ore.

b. Radiated, or antimoniated lead-ore.

c. Tessellated, or potter's lead-ore.

At Villach in Austria there is said to be found a potter's lead-ore, which contains not the least portion of silver.

2. Mineralised by the vitriolic acid.

This ore was discovered by Mr Monnet. It occurs sometimes, though rarely, in the form of a white ponderous calx; and seems to originate from the spontaneous decomposition of the sulphurated lead-ores above mentioned.

3. By the acid of phosphorus.

This ore was lately discovered by Gahn; and is of a greenish colour, by reason of a mixture of iron. See the article LEAD, par. 6.

4. With sulphurated silver. *Galena*; also called *bleyglanz* by the Germans. Potter's ore.

a. Steel-grained.

b. With small scales.

c. Fine-grained.

d. Of a fine cubical texture; and,

e. Of coarse cubes. These two varieties are found in all the Swedish silver-mines.

f. Crystallised.

The steel-grained and scaly ores are of a dim and dull appearance when they are broken, and their particles have no determined angular figure: they are therefore in Swedish commonly called *blyschweif*; in opposition to the cubical ores, which are called *blyglanz*. The most part of the ores called *blyglanz* contain silver, even to 24 ounces per cent. of which we have instances in the mines of Salberg, where it has been observed, that the coarse cubical lead ores are generally the richest in silver, contrary to what is commonly taught in books; the reason of which may perhaps be, that, in making the essays on these two ores, the coarse cubical can be chosen purer or freer

freer from the rock than the fine cubical ores.

5. With sulphurated iron and silver. This is found,

a. Fine-grained. b. Fine cubical. c. Coarse-cubical. When this ore is scorified, it yields a black slag; whereas the preceding lead-ores yield a yellow one, because they do not contain any iron.

6. With sulphurated antimony and silver; antimoniated or radiated lead-ore. This has the colour of a blyglanz, but is of a radiated texture.

It is found,

a. Of fine rays and fibres; and,
b. Of coarse rays or fibres. The lead in this ore prevents any use being made of the antimony to advantage; and the antimony likewise in a great measure hinders the extracting of the silver.

7. Mineralised by arsenic.

This ore was lately discovered in Siberia.—Externally it is of a pale, and internally of a deep red, colour. See the article LEAD, par. 10.

- C. Mixed with earth; stony, or sandy lead ores.

These consist either of the calciform or of the galena kind, intimately mixed and diffused through stones and earth, chiefly of the calcareous or of the barytic genus. See LEAD, par. 11.

Uses, &c. of Lead. See LEAD, and the other articles above referred to.

- III. Copper; *Cuprum*, *Venus*, *Æs*. (See the article COPPER: Also CHEMISTRY-Index; and METALLURGY, Part II. sect. iv. and Part III. sect. iv.)

This metal is,

- a. Of a red colour.
b. It is pretty soft and tough.
c. The calx of copper being dissolved by acids becomes green, and by alkalies blue.
d. It is easily calcined in the fire into a blackish blue substance, which, when rubbed to a fine powder, is red; when melted together with glass, it tinges it first reddish brown, and afterwards of a transparent green or sea-green colour.
e. It dissolves in all the acids, and likewise in alkaline solutions. It is easier dissolved when in form of a calx than in a metallic state, especially by the acids of vitriol and sea-salt, and the vegetable acid.
f. Vitriol of copper is of a deep blue colour; but the vegetable acid produces with the copper a green salt, which is verdigris.
g. It can be precipitated out of the solutions in a metallic state; and this is the origin of the precipitated copper of the mines called *Ziment copper*.
h. It is not easily amalgamated with quicksilver; but requires for this purpose a very strong trituration, or the admixture of the acid of nitre.
i. It becomes yellow when mixed with zinc, which

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has a strong attraction to it, and makes brass, pinchbeck, &c.

- k. When this metal is exposed to the fire, it gives a green colour to the flame in the moment it begins to melt, and continues to do so afterwards, without losing any thing considerable of its weight.

- [1.] Native copper.

Copper found naturally in a metallic state, is called *virgin* or *native copper*. It is met with,

1. Solid.
2. Friable, in form of small, and somewhat coherent grains. Precipitated or *ziment copper*.

- [2.] Calciform.

Copper, in form of a calx, is found,

- 1.) Pure.
A. Loose or friable; *Ochra veneris*.
1. Blue; *Ceruleum montanum*. Very seldom found perfectly free from a calcareous substance.
2. Green; *Viride montanum*. Both this and the former colour depend on menstrea, which often areedulcorated or washed away.
3. Red. This is an efflorescence of the glass copper ore.
B. Indurated. Glass copper-ore.
a. Red. This is sometimes as red as sealing wax, and sometimes of a more liver-brown colour.
It is always found along with native copper, and seems to have lost its phlogiston by way of efflorescence, and to be changed into this form. It is likewise found with the sulphurated copper, improperly called *glass copper-ore*.

- 2.) Mixed.

- A. Loose or friable; *Ochra veneris friabilis impura*.
1. Mixed with a calcareous substance; *Ceruleum montanum*. In this state copper-blue is mostly found. It ferments during the solution in aquafortis.
2. Mixed with iron. Black. It is the decomposition of the Fahlun copper ore.
B. Indurated.
1. Mixed with gypsum, or plaster. Green.
2. Mixed with quartz. a. Red, from Sunnerskog in the province of Smoland.
3. Mixed with lime. a. Blue. This is the *Lapis Armenus*, according to the accounts given of it by authors.

- 3.) Cupreous stones.

Analogous to the calciform copper ores, are,

1. The *lapis armenus*. } See the detached article COPPER, n° 7.
2. The turquoise. }

- [3.] Dissolved and mineralised; *Cuprum mineralisatum*.

- A. With sulphur alone. Grey copper-ore; also called, improperly, *glass copper-ore*.

a. Solid, without any certain texture, and very soft, so that it can be cut with a knife almost as easily as black lead.

- b. Fine cubical. In Smoland this is sometimes

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- times found decomposed or weathered, and changed into a deep mountain blue.
- B. With sulphurated iron. *Minera cupri pyritacea*; yellow copper ore. Marcasitical copper ore; *Pyrites cupri*. This is various both in regard to colour and in regard to the different proportion of each of the contained metals; for instance,
- Blackish grey, inclining a little to yellow; *Pyrites cupri griseus*. When decayed or weathered, it is of a black colour; is the richest of all the varieties of this kind of copper ore, yielding between 50 and 60 per cent. and is found in Spain and Germany.
 - Reddish yellow, or liver brown, with a blue coat on the surface; *Minera cupri lazurea*. This ore yields between 40 and 50 per cent. of copper, and is commonly said to be blue, though it is as red, when fresh broken, as a red copper regulus.
 - Yellowish green; *Pyrites cupri flavo viridescens*. This is the most common in the north part of Europe: and is, in regard to its texture, found,
 1. Solid, and of a shining texture.
 2. Steel-grained, of a dim texture.
 3. Coarse-grained, of an uneven and shining texture.
 4. Crystallised marcasitical copper ore.
 - a. Of long octoëdric crystals.
 - Pale yellow. This cannot be described but as a marcasite, though an experienced eye will easily discover some difference between them. It yields 22 per cent. of copper.
 - Liver-coloured.
 - With sulphurated silver, arsenic, and some iron. Fallow copper-ore; which contains only a few ounces of silver. This ore is found in Hungary and Germany, where it is called *black copper ore*.
 - With sulphurated arsenic and iron. White copper ore.
 - Pyritous copper, with arsenic and zinc. According to Mr Monnet, this ore is found at Catharineberg in Bohemia. It is of a brown colour; of a hard, solid, compact, granular texture; and contains from 18 to 30 per cent. of copper.
 - Dissolved by the vitriolic acid; *Vitriolum verneris*. See the article copper, n° xiii.
 - With phlogiston. Copper coal ore, consisting of the calces of copper, mixed with a bituminous earth.
 - Mineralised by the muriatic acid. This ore was found in Saxony, and had been generally mistaken for a micaceous substance, which in fact it greatly resembles. It has not yet been found in large masses, but only in a superficial form, like a crust over other ores. It is moderately hard and friable; of a fine green colour, and sometimes of a bluish green, crystallised in a cubic form, or with a foliated texture, or in little scales resembling green mica or talc. This ore is easily dissolved by

nitrous acid: the solution takes a green colour; and the metal may be precipitated on a polished plate of iron. If some drops of a nitrous solution of silver be mixed with it, a white powder of *luna cornea* will be precipitated, which discovers the presence of the muriatic acid in this ore.

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The uses of copper are very numerous, although not thoroughly known to every one. Several of these have been mentioned under the detached article, and in CHEMISTRY. Others of great importance may be here added. Its great ductility, lightness, strength, and durability, render it of very extensive utility. Blocks, or bars of copper, are reduced into flat sheets of any thickness, by being first heated by the reverberation of the flame, in a low-vaulted furnace, properly constructed for the purpose; and then immediately applied between large rollers of steel, or rather of case-hardened iron, turned by a water-wheel or by the strength of horses, so that the hot metal is there quickly squeezed; and the operation is repeated, bringing the rollers every time nearer to one another, till the metallic sheet acquires the intended thickness.

These copper sheets are very advantageously employed in sheathing the bottoms of men of war and other vessels, which by this means are prevented from being attacked by the sea worms, and are kept clean from various marine concretions, so as to sail with considerably greater swiftness. Copper sheets are also employed to cover the tops of buildings instead of slates or earthen tiles, as is used in Sweden; and some architects have begun to introduce the use of copper covering into Great Britain, which is much lighter, and may be used with great advantage, although it must be much dearer in the prime cost.

Sundry preparations of copper are employed in painting, staining, and for colouring glass and enamels. See GLASS and ENAMEL.

The solution of copper in aqua-fortis stains marble and other stones of a green colour; when precipitated with chalk or whiting, it yields the green and the blue verditer of the painters. According to Lewis, a solution of the same metal in volatile spirits stains ivory and bones: when macerated for some time in the liquor, they become of a fine blue colour, which, however, tarnishes by exposure to the air, and becomes green afterwards.

The same author prepared elegant blue glasses, by melting common glass, or powdered flint and fixed alkaline salt, with blue vitriol, and with an amalgam of copper; fine green ones were made with green verditer, and with blue verditer, as well as with the precipitate of copper made by fixed alkalies, and with a precipitate by zinc; and a reddish glass was produced by the calx and scoria of copper made by fire alone. Even in this vitreous state, it seems as if a continuance of fire had the same effect in regard to colour, as air has upon copper in other forms; as some of the most beautiful blue glasses, by continued fusion, have changed

changed to a green colour. See farther the article *BRASS in the Glass-trade*.

Verdegris is a preparation of copper dissolved by the vegetable acids, which act on this metal, dissolving it very slowly, but in considerable quantities. It produces a fine green pigment for painting both in oil and water colours, inclining more or less to the bluish according to circumstances.

So great is the tenacity of copper, that a wire of a tenth of an inch in diameter is capable of supporting 299.5 pounds weight before it breaks.—Copper may be drawn into very fine wire, and beaten into extremely thin plates. The German artists, chiefly those of Nuremberg and Augsburg, are said to possess the best method for giving to these thin plates of copper a fine yellow colour like that of gold. See the articles *BRASS-Colour* and *BRASS-Leaf*.

The parings or shreds of these very thin leaves of yellow copper being well ground on a marble plate, are reduced to a powder similar to gold, which serves to cover, by means of some gum-water, or other adhesive fluid, the surface of various mouldings or other pieces of curious workmanship, giving them the appearance of real bronze, and even of fine gold, at a very trifling expence; because the gold colour of this metallic powder may be easily raised and improved by stirring it on a wide earthen basin over a slow fire.

In some of its states, copper is as difficultly extended under the hammer as iron, but proves softer to the file, and never can be made hard enough to strike a spark with flint or other stones; from whence proceeds the use that is made of this metal for chisels, hammers, hoops, &c. in the gun-powder works.

The vitriolic acid does not act on copper unless concentrated and boiling: during this solution a great quantity of sulphureous gas flies off; afterwards a brown thickish matter is found, which contains the calx of the metal partly combined with the acid. By solution and filtration, a blue solution is obtained, which being evaporated to a certain degree, produces after cooling long rhomboidal crystals of a beautiful blue colour, called vitriol of copper; but if this solution be merely exposed a long time to the air, it affords crystals, and a green calx is precipitated, a colour which all calces of this metal assume when dried by the air. Blue vitriol, however, is seldom formed by dissolving the metal directly in the vitriolic acid. That sold in the shops is mostly obtained from copper pyrites. It may also be made by stratifying copper-plates with sulphur, and cementing

them together for some time; because the vitriolic acid of the sulphur being disengaged, attacks and corrodes the metal, forming a metallic salt, which by affusion of water yields perfect crystals of blue vitriol. See *VITRIOL*.

The nitrous acid, on the contrary, dissolves copper when cold with great rapidity; and a great quantity of smoking air or gas flies off, which, on being received in a pneumatic apparatus, and mixed in a glass tube with atmospheric air, shows its good or bad quality for the respiration of living animals, according as the common bulk is more or less diminished. This is one of the most important of Dr Priestley's discoveries; and various instruments known by the name of *eudiometers* have been since invented for making these experiments with ease and satisfaction. See *EUDIOMETER*.

But the most common use of copper is to make all sorts of large stills, boilers, pots, funnels, and other vessels employed by distillers, dyers, chemists, and various other manufacturers, who make use of large quantities of hot liquors in their various operations.

Although copper when pure is extremely valuable, on account of its ductility, lightness, and strength, it is, however, less useful on many occasions from the difficulty of forming large masses of work, as it is not an easy matter to cast copper solid, so as to retain all its properties entire. For if the heat be not sufficiently great, the metal proves deficient in toughness when cold; and if the heat be raised too high, or continued for a length of time, the copper blisters on the surface when cast in the moulds; so that the limits of its fusion are very contracted. And from these circumstances pure copper is rendered less applicable to several purposes.

We find, however, that the addition of a certain proportion of zinc removes almost all these inconveniences, and furnishes a mixed metal more fusible than copper, very ductile and tenacious when cold, which does not so readily scorify in a moderate heat, and which is less apt to rust from the action of air and moisture.

Copper is the basis of sundry compound metals for a great number of mechanical and æconomical uses of life, such as brass (v), prince's-metal, tombac, bell-metal, white copper, &c. See *CHEMISTRY*, n° 1154, &c.

If the mixture is made of four to six parts of copper, with one part of zinc, it is called *Prince's-metal*. If more of the copper is taken, the mixture will be of a deeper yellow, and then goes by the name of *tombac*.

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Bell.

(v) Brass is frequently made by cementing plates of copper with calamine, where the copper imbibes one-fourth or one-fifth its weight of the zinc which rises from the calamine. The process consists in mixing three parts of calamine and two of copper with charcoal dust in a crucible, which is exposed to a red heat for some hours, and then brought to fusion. The vapours of the calamine penetrate the heated plates of copper, and add thereby to its fusibility. It is of great consequence for the success of this process to have the copper cut into small pieces, and intimately blended with the calamine. See *CHEMISTRY*, n° 1154.

In most foreign founderies the copper is broken small by mechanical means with a great deal of labour; but at

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Bell-metal is a mixture of copper and tin, forming a compound extremely hard and sonorous, and is less subject to alterations by exposure to the air than any other cheap metal. On this account it is advantageously employed in the fabrication of various utensils and articles, as cannons, bells, statues, &c. in the composition of which, however, other metals are mixed in various proportions, according to the fancy and experience of the artist.

White-copper is prepared with arsenic and nitre, as mentioned under CHEMISTRY, n° 1157.

But the principal kind of white-copper is that with which speculums of reflecting telescopes are made. See the article SPECULUM.

VII. Iron; *Ferrum, Mars*. This metal is,

- a. Of a blackish blue shining colour.
- b. It becomes ductile by repeated heating between coals and hammering.
- c. It is attracted by the loadstone, which is an iron ore; and the metal itself may also be rendered magnetical.
- d. Its specific gravity to water is as 7,645, or 8000:1000.
- e. It calcines easily to a black scaly calx, which, when pounded, is of a deep red colour.
- f. When this calx is melted in great quantity with glass compositions, it gives a blackish brown colour to the glass; but in a small quantity a greenish colour, which at last vanishes if forced by a strong degree of heat.

g. It is dissolved by all salts, by water, and like wise by their vapours. The calx of iron is dissolved by the spirit of sea-salt and by aqua-regia.

b. The calx of the dissolved metal becomes yellow, or yellowish brown: and in a certain degree of heat it turns red.

i. The same calx, when precipitated from acids by means of the fixed alkali, is of a greenish colour; but it becomes blue when precipitated by means of an alkali united with phlogiston; in which last circumstance the phlogiston unites with the iron: these two precipitates lose their colour in the fire, and turn brown.

k. The vitriol of iron is brown.

Iron is found,

[1.] Native. See the detached article IRON.

[2.] In form of calx.

A. Pure.

A. Loose and friable. Martial ochre; *Minera ochracea*.

1. Powdery; *Ochra ferri*. This is commonly yellow or red, and is iron which has been dissolved by the vitriolic acid.

2. Concreted. Bog-ore.

a. In form of round porous balls.

b. More solid bars.

c. In small flat pieces, like cakes or pieces of money.

d. In small grains.

e. In

at Bristol the workmen employ an easier method. A pit is dug in the ground of the manufacture about four feet deep, the sides of which are lined with wood. The bottom is made of copper or brass, and is moveable by means of a chain. The top is made also of brass with a space near the centre, perforated with small holes, which are luted with clay; through them the melted copper is poured, which runs in a number of streams into the water, and this is perpetually renewed by a fresh stream that passes through the pit. As the copper falls down it forms itself into grains, which collect at the bottom. But great precaution is required to hinder the dangerous explosions which melted copper produces when thrown into cold water; which end is obtained by pouring small quantities of the metal at once. The granulated copper is completely mixed with powdered calamine, and fused afterwards. The process lasts eight or ten hours, and even some days, according to the quality of the calamine.

It is a wonderful thing, says Cramer, that zinc itself, being simply melted with copper, robs it of all its malleability; but if it be applied in form of vapour from the calamine, the sublimes, or the flowers, it does not cause the metal to become brittle.

The method mentioned by Cramer to make brass from copper, by the volatile emanations of zinc, seems to be preferable to any other process, as the metal is then preserved from the heterogeneous parts contained in the zinc itself, or in its ore. It consists in mixing the calamine and charcoal with moistened clay, and ramming the mixture to the bottom of the melting pot, on which the copper, mixed also with charcoal, is to be placed above the rammed matter. When the proper degree of heat is applied, the metallic vapour of the zinc contained in the calamine will transpire through the clay, and attach itself to the copper, leaving the iron and the lead which were in the calamine retained in the clay, without mixing with the upper metal. Dr Watson says, that a very good metallurgist of Bristol, named John Champion, has obtained a patent for making brass by combining zinc in the vapourous form with heated copper plates; and that the brass from this manufacture is reported to be of the finest kind: but he knows not whether the method there employed is the same with that mentioned by Cramer.

Brass is sometimes made in another way, by mixing the two metals directly; but the heat requisite to melt the copper makes the zinc burn and flame out, by which the copper is defrauded of the due proportion of zinc. If the copper be melted separately, and the melted zinc poured into it, a considerable and dangerous explosion ensues; but if the zinc is only heated and plunged into the copper, it is quickly imbibed and retained. The union, however, of these two metals succeeds better if the flux composed of inflammable substances be first fused in the crucible, and the copper and zinc be poured into it. As soon as they appear thoroughly melted, they are to be well stirred, and expeditiously poured out, or else the zinc will be inflamed, and leave the red copper behind.

e. In lumps of an indeterminate figure. All these are of a blackish brown, or a light brown colour.

B. Indurated. The blood-stone; *Hematites*.

(1.) Of an iron colour; *Hematites carulefcens*.

This is of a bluish grey colour; it is not attracted by the loadstone, yields a red powder when rubbed, and is hard.

a. Solid, and of a dim appearance when broken.

b. Cubical, and of a shining appearance when broken.

c. Fibrous, is the most common *torrsten* of Sweden.

d. Scaly: the *eisenram* of the Germans.

1. Black.

2. Bluish grey. When this is found along with marcasite, it is not only attracted by the loadstone, but is of itself really a loadstone.

e. Crystallised.

1. In octoedrical crystals.

2. In polyedrical crystals.

3. In a cellular form.

These varieties are the most common in Sweden, and are very seldom blended with marcasite or any other heterogeneous substance except their diffeent beds. It is remarkable, that when these ores are found along with marcasite, those particles which have lain nearest to the marcasite are attracted by the loadstone, although they yield a red or reddish brown powder, like those which are not attracted by the loadstone: it is likewise worth observation, that they generally contain a little sulphur, if they are imbedded in a limestone rock.

(2.) Blackish brown bloodstone; *Hematites nigrescens*. Kidney ore. This yields a red or brown powder when it is rubbed; it is very hard, and is attracted by the loadstone.

a. Solid, with a glassy texture.

b. Radiated.

c. Crystallised.

1. In form of cones, from Siberia.

2. In form of concentric balls, with a facettèd surface. These are very common in Germany, but very scarce in Sweden.

(3.) Red bloodstone; *Hematites Ruber*. Red kidney ore.

a. Solid, and dim in its texture.

b. Scaly. The *eisenram* of the Germans. This is commonly found along with the iron-coloured iron glimmer, and smears the hands.

c. Crystallised, in concentric balls, with a flat or facettèd surface.

(4.) Yellow bloodstone; *Hematites flavus*.

a. Solid.

b. Fibrous.

The varieties of the colours in the bloodstone are the same with those produced in the

calces of iron made by dry or liquid menstrua and afterwards exposed to different degrees of heat.

B. Mixed with heterogeneous substances.

A. With a calcareous earth. White spathose iron ore. The *stahlstein* of the Germans.

B. With a siliceous earth. The martial jasper of Sinople.

C. With a garnet earth. Garnet and cockle or shirl.

D. With an argillaceous earth. The bole.

E. With a micaceous earth. Mica.

F. With manganese.

G. With an alkali and phlogiston. Blue martial earth. Native Prussian-like blue.

1. Loose or powdery.

H. With an unknown earth, which hardens in water. Tarras; *Cementum*.

1. Loose or granulated; *Terra Puzzolana*. This is of a reddish brown colour, is rich in iron, and is pretty fusible.

2. Indurated; *Cementum induratum*. This is of a whitish yellow colour, contains likewise a great deal of iron, and has the same quality with the former to harden soon in water when mixed with mortar. This quality cannot be owing to the iron alone, but rather to some particular modification of it occasioned by some accidental causes, because these varieties rarely happen at any other places except where volcanoes have been, or are yet, in the neighbourhood.

[3.] Dissolved or mineralised.

A. With sulphur alone.

A. Perfectly saturated; *Ferrum sulphure saturatum*. Marcasite.

B. With very little sulphur. Black iron ore. Iron stone.

This is either attracted by the loadstone, or is a loadstone itself attracting iron; it resembles iron, and yields a black powder when rubbed.

1.) Magnetic iron ore. The loadstone, *Magnes*.

a. Steel-grained, of a dim texture, from Hogberget in the parish of Gagnœf in Dalarne: it is found at that place almost to the day, and is of as great strength as any natural loadstones were ever commonly found.

b. Fine grained, from Saxony.

c. Coarse-grained, from Spetalsgrufvan at Norberg, and Kierrgrufvan, both in the province of Westmanland. This loses very soon its magnetical virtue.

d. With coarse scales, found at Sandswær in Norway. This yields a red powder when rubbed.

2.) Refractory iron ore. This in its crude state is attracted by the loadstone.

a. Giving a black powder when rubbed; *Tritura atra*. Of this kind are,

1. Steel-grained.

2. Fine grained.

3. Coarse

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3. Coarse grained.

This kind is found in great quantities in all the Swedish iron mines, and of this most part of the fusible ores consist, because it is commonly found in such kinds of rocks as are very fusible: and it is as seldom met with in quartz as the hæmatites is met with in limestone.

3. Rubbing into a red powder. These are real hæmatites, that are so far modified by sulphur or lime as to be attracted by the loadstone.

1. Steel-grained.

2. Fine-grained. Emery. This is imported from the Levant: it is mixed with mica, is strongly attracted by the loadstone, and smells of sulphur when put to the fire.

3. Of large shining cubes.

4. Coarse, scaly. The *eisenglimmer* or *eisenran*.

[4.] Mixed with various fossile substances.

1. With sulphur and clay; Pyrites.
2. With arsenic; called *mispickel* by the Germans, and *plate mundic* in Cornwall.
3. With sulphurated arsenic. Arsenical pyrites.
4. With vitriolic acid. Martial vitriol.
5. With phlogiston. Martial coal ore.
6. With other sulphurated and arsenicated metals.

See these in their respective arrangements.

Uses and Properties of Iron. Iron is the most common metal in nature, and at the same time the most useful in common life; notwithstanding which, its qualities are perhaps very little known.

Iron has a particular and very sensible smell when strongly rubbed or heated; and a styptic taste, which it communicates to the water in which it is extinguished after ignition. Its tenacity, ductility, and malleability, are very great. It exceeds every other metal in elasticity and hardness, when properly tempered. An iron wire of one-tenth of an inch thick is able to support 450 pounds weight without breaking, as Wallerius asserts.

Iron drawn into wire as slender as the finest hairs. It is more easily malleable when ignited than when cold; whereas other metals, though ductile when cold, become quite brittle by heat.

It grows red-hot sooner than other metals: nevertheless it melts the most difficultly of all, platina and manganese excepted. It does not tinge the flame of burning matters into bluish or greenish colours, like other imperfect metals, but brightens and whitens it; hence the filings of iron are used in compositions of fire-works, to produce what is called *white-fire*.

Iron, or rather steel, expands the least of all hard metals by the action of heat; but brass expands the most: and on this account these two metals are employed in the construction of compound pendulums for the best sort of regulating clocks for astronomical purposes.

Iron, in the act of fusion, instead of continuing to expand, like the other metals, shrinks, as Dr Lewis observes; and thus becomes so much more

dense as to throw up such part as is unmelted to the surface; whilst pieces of gold, silver, copper, lead, and tin, put in the respective metals in fusion, sink quickly to the bottom. But in its return to a consistent state, instead of shrinking, like other metals, it expands; sensibly rising in the vessel, and assuming a convex surface, whilst the others subside, and appear concave. This property of iron was first taken notice of by Reaumur, and excellently fits it for receiving impressions from the moulds into which it is cast, being forced into their minutest cavities. Even when poured thick into the mould, it takes, nevertheless, a perfect impression; and it is observed, that cast iron is somewhat larger than the dimensions of the mould, whilst cast figures of other metals are generally smaller.

The vitriolic acid dissolves iron readily, and forms green vitriol.

This acid requires to be diluted with 304 times its quantity of water, to enable it effectually to dissolve iron; and, during the dissolution, a strong aerial fluid arises, called *inflammable air*, which, on being mixed with atmospheric air, takes fire at the approach of the flame of a candle. A glass phial, of about two ounces measure, with one third of inflammable air, and the rest of common air, produces a very loud report if opened in the same circumstance; and if it be filled with two-thirds of inflammable air, mixed with one of dephlogisticated air, the report will be as loud as the explosion of a pistol with gunpowder.

Dilute nitrous acid dissolves iron; but this saline combination is incapable of crystallising. Strong nitrous acid corrodes and dephlogisticates a considerable quantity of iron, which falls to the bottom.

Marine acid likewise dissolves iron, and this solution is also incrySTALLISABLE.

The Prussian acid precipitates iron from its solutions in the form of Prussian blue.

This metal is likewise sensibly acted upon by alkaline and neutral liquors, and corroded even by those which have no perceptible saline impregnation; the oils themselves, with which iron utensils are usually rubbed to prevent their rusting, often promote this effect in some measure, unless the oils had been previously boiled with litharge or calces of lead.

Galls, and other astringent vegetables, precipitate iron from its solutions, of a deep blue or purple colour, of so intense a shade as to appear black. It is owing to this property of iron that the common writing ink is made. The infusion of galls, and also the Prussian alkali, are tests of the presence of iron by the colours they produce on any fluid. Acids, however, dissolve the coloured precipitates by the former; and hence it arises that the marine acid is successfully applied to take off ink spots and iron stains from white linens. Alkalis, however, convert these iron precipitates into a brown ochre.

Iron has a strong affinity with sulphur. If a bar of iron be strongly ignited, and a roll of brimstone be applied to the heated end, it will combine

bine with the iron, and form a fusible mass, which will drop down. A vessel of water ought to be placed beneath for the purpose of receiving and extinguishing it, as the fumes would otherwise be very inconvenient to the operator.

A mixture of iron-filings and sulphur in powder, moistened with water, and pressed so as to form a paste, will in a few hours swell, become hot, fume, and even burst into a flame, if the quantity is large. The residuum furnishes martial vitriol. This process is similar to the decomposition of martial pyrites; from which some philosophers account for hot spring-waters and subterraneous fires. The mixture of water in this paste seems to be necessary to enable the vitriolic acid of the sulphur to act on the iron.

For other chemical properties of this metal, see CHEMISTRY-Index; for its electrical and magnetic properties, see ELECTRICITY and MAGNETISM. For a more particular account of its nature and uses, and the methods of making and manufacturing it, see the articles IRON and STEEL; also METALLURGY, Part II. sect. vii. and Part III. sect. v.

Order III. SEMIMETALS.

I. Bismuth; tin-glafs. *Vismutum, Bismutum, Marcasita officinalis.* It is,

- a. Of a whitish yellow colour.
- b. Of a laminated texture, soft under the hammer, and nevertheless very brittle.
- c. It is very fusible; calcines and scorifies like lead, if not rather easier; and therefore it works on the cuppel. It is pretty volatile in the fire.
- d. Its glafs or slag becomes yellowish brown, and has the quality of retaining some part of the gold, if that metal has been melted, calcined, and vitrified with it.
- e. It may be mixed with the other metals, except cobalt and zinc, making them white and brittle.
- f. It dissolves in aquafortis, without imparting to it any colour; but to the aqua-regia it gives a red colour, and may be precipitated out of both these solutions with pure water into a white powder, which is called *Spanish white*. It is also precipitated by the acid of sea-salt; which last unites with it, and makes the *vismutum corneum*.
- g. It amalgamates easily with quicksilver. Other metals are so far attenuated by the bismuth, when mixed with it, as to be strained or forced along with the quicksilver through skins or leather.

Bismuth is found in the earth.

A. Native. This resembles a regulus of bismuth, but consists of smaller scales or plates.

1. Superficial, or in crusts.
2. Solid, and composed of small cubes.

B. In form of calx.

1. Powdery or friable; *Ochra vismuti*. This is of a whitish yellow colour; it is found in form of an efflorescence.

It has been customary to give the name of *flowers of bismuth* to the pale red calx of cobalt, but it is wrong; because neither the calx of bismuth, nor its solutions, become red, this being a quality belonging to the cobalt.

C. Mineralised bismuth. This is, with respect to colour and appearance, like the coarse tessellated potter's lead ore; but it consists of very thin square plates or flakes, from which it receives a radiated appearance when broken crosswise.

1. With sulphur.
 - a. With large plates or flakes.
 - b. With fine or small scales.
2. With sulphurated iron.
 - a. Of coarse wedge-like scales.

This mineralised bismuth ore yields a fine radiated regulus; for which reason it has been ranked among the antimonial ores by those who have not taken proper care to melt a pure regulus ore destitute of sulphur from it; while others, who make no difference between regulus and pure metals, have still more positively asserted it to be only an antimonial ore.

3. With sulphur and arsenic.
 - a. Of a whitish yellow or ash colour. It has a shining appearance; and is composed of small scales or plates, intermixed very small yellow flakes: It is of a hard and solid texture: Sometimes strikes fire with hard steel: Has a disagreeable smell when rubbed: Does not effervesce with aqua-fortis; but is partially dissolved by the same acid (z).
 - b. Grey, of a striated form; found at Helsingland in Sweden, and at Annaberg in Saxony.
 - c. With variegated colours of red, blue, and yellow grey; found at Schneeberg in Saxony.
 - d. With green fibres like an amianthus; at Misnia in Germany, and at Gillebeck in Norway.
 - e. With yellow red shining particles, called *mines de bismuth Tigrées* in French, at Georgenstadt in Germany, and at Annaberg in Saxony.
 - f. The *minera bismuthi arenacea*, mentioned by Wallerius and Bomare, belongs also to the same kind of the arsenicated ores.

4. By vitriolic acid. This ore is called *vismuth bluth* by the Germans. It is said to be of a yellowish, reddish, or variegated colour; and to be found mixed with the calx of bismuth, incrusting other ores. *Kirwan*, p. 334.

Uses, &c. of *Bismuth*. See the article BISMUTH. Also CHEMISTRY-Index; and METALLURGY, Part II. sect. x. and Part III. sect. viii.

II.

(z) This solution, being diluted with water, becomes a kind of sympathetic ink; as the words written with it on white paper, and dried, are not distinguished by the eye; but on being heated before the fire, they assume a yellowish colour.

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Zinc.II. Zinc; speltre. *Zincum*.

- a. Its colour comes nearest to that of lead, but it does not so easily tarnish.
- b. It shows a texture when it is broken, as if it were compounded of flat pyramids (A).
- c. Its specific gravity to water is as 6,900 or 7000 to 1000.
- d. It melts in the fire before it has acquired a glowing heat; but when it has gained that degree of heat, it burns with a flame of a changeable colour, between blue and yellow. If in an open fire, the calx rises in form of soft white flowers; but if in a covered vessel, with the addition of some inflammable, it is distilled in a metallic form: in which operation, however, part of it is sometimes found vitrified.
- e. It unites with all the metals (B) except bismuth and nickel, and makes them volatile. It is, however, not easy to unite it with iron without the addition of sulphur. It has the strongest attraction to gold and copper, and this last metal acquires a yellow colour by it; which has occasioned many experiments to be made to produce new metallic compositions.
- f. It is dissolved by all the acids: of these the vitriolic acid has the strongest attraction to it; yet it does not dissolve it, if it is not previously diluted with much water.
- g. Quicksilver amalgamates easier with zinc than with copper; by which means it is separated from compositions made with copper.
- h. It seems to become electrical by friction.

Zinc is found,

A. Native.

Zinc has been met with native, though rarely, in the form of thin and flexible filaments, of a grey colour, which were easily inflamed when applied to a fire. And Bomare affirms that he has seen many small pieces of native zinc among the calamine-mines in the duchy of Limbourg and in the zinc-mines at Goslar, where this semimetal was always surrounded by a kind of ferruginous yellow earth, or ochraceous substances. See the detached article ZINC.

B. In form of calx.

N^o 224.

(1.) Pure.

a. Indurated.

1. Solid
2. Crystallised.

This is of a whitish-grey colour, and its external appearance is like that of a lead spar; it cannot be described, but is easily known by an experienced eye. —It looks very like an artificial glass of zinc; and is found among other calamines at Namur and in England.

(2.) Mixed.

A. With a martial ochre.

1. Half indurated. Calamine; *Lapis calaminaris*.

a. Whitish yellow.

- b. Reddish brown. This seems to be a mouldered or weathered blende.

B. With a martial clay or bole.

c. With a lead ochre and iron.

D. With quartz: Zeolite of Friburgh.

The real contents of this substance were first discovered by M. Pelletier. It was long taken for a true zeolite, being of a pearl colour, crystallised, and semitransparent. It consists of laminae, diverging from different centres, and becoming gelatinous with acids. Its contents are 48 to 52 per cent. of quartz, 36 of calx of zinc, and 8 or 12 of water. (*Kirwan*, p. 318.)

C. Mineralised.

- (1.) With sulphurated iron. Blende, mock-lead, black-jack, mock-ore; *pseudogalena* and blende of the Germans.

A. Mineralised zinc in a metallic form. Zinc ore. This is of a metallic bluish-grey colour, neither perfectly clear as a potter's ore, nor so dark as the Swedish iron ores.

1. Of a fine cubical or scaly texture.
2. Steel-grained.

B. In form of calx. Blende. Mock-lead; *Sterile nigrum*. *Pseudo-galena* (c). This is found,

1. With coarse scales.
 - a. Yellow; semi-transparent.
 - b. Greenish.

c. Greenish.

(A) It cannot be reduced into powder under the hammer like other semimetals. When it is wanted very much divided, it must be granulated, by pouring it while fused into cold water; or filed, which is very tedious, as it stuffs and fills the teeth of the file. But if heated the most possible without fusing it, Macquer asserts, that it becomes so brittle as to be pulverised in a mortar.

(B) It brightens the colour of iron almost into a silver hue; changes that of copper to a yellow or gold colour, but greatly debases the colour of gold and destroys its malleability. It improves the colour and lustre of lead and tin, rendering them firmer, and consequently fitter for sundry mechanic uses. Lead will bear an equal weight of zinc, without losing too much of its malleability.—The process for giving the yellow colour to copper, by the mixture of zinc, and of its ore called *calamine*, has been described above under the *Uses of Copper*.

(C) The varieties of pseudo-galena, or black-jack, are in general of a lamellar or scaly texture, and frequently of a quadrangular form, resembling galena. They all lose much of their weight when heated, and burn with a blue flame; but their specific gravity is considerably inferior to that of true galena. Almost all contain a mixture of lead-ore. Most of them exhale a sulphureous smell when scraped; or at least when vitriolic or marine acid is dropped on them.

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Zinc.

- c. Greenish-black; *pechblende*, or *pitchblende* of the Germans.
 d. Blackish-brown.
2. With fine scales,
 a. White.
 b. Whitish-yellow.
 c. Reddish-brown.
3. Fine and sparkling; at Goslar called *braun blyertz*. Its texture is generally scaly; sometimes crystallised and semitransparent. It gives fire with steel; but does not decrepitate, nor smoke when heated: yet it loses about 13 per cent. of its weight by torrefaction.
 a. Dark-brown.
 b. Red, which becomes phosphorescent when rubbed; found at Scharfenberg in Misnia. (*Brunich*).
 c. Greenish, yellowish-green, or red. It has different degrees of transparency, and is sometimes quite opaque. When scraped with a knife in the dark, it emits light, even in water; and after undergoing a white heat, if it is distilled *per se*, a siliceous sublimate rises, which shows it contains the sparry acid, probably united to the metal, since it sublimes.
4. Of a metallic appearance; *glanz blende*.
 This is of a bluish-grey, of a scaly or steel-grained texture, and its form generally cubical or rhomboidal. It loses nearly one sixth of its weight by calcination; and after calcination it is more soluble in the mineral acids.
 100 parts of this ore afforded to Bergman about 52 of zinc, 8 of iron, 4 of copper, 26 of sulphur, 6 of flux, and 4 of water.
5. Crystalline.
 a. Dark-red, very scarce; found in a mine near Freyberg. Something like it is found at the Morgenstern and Himmelsfuste.
 b. Brown. In Hungary and Transylvania.
 c. Black. Hungary.

These varieties may easily be mistaken for rock crystals; but by experience they may be distinguished on account of their lamellated texture and greater softness. Their transparency arises from a very small portion of iron in them.

(2.) Zinc mineralised by the vitriolic acid.

This ore has been already described among the middle Salts, at *Vitriol of zinc*.

Uses, &c. of zinc. See the detached article ZINC: Also CHEMISTRY-Index; and METALLURGY, Part II. sect. xii. and Part III. under sect. iii.

III. Antimony; *Antimonium Stibium*. This semimetal is,

- a. Of a white colour almost like silver.
 b. Brittle; and, in regard to its texture, it consists

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of shining planes of greater length than breadth.

- c. In the fire it is volatile, and volatilises part of the other metals along with it, except gold and platina. It may, however, in a moderate fire, be calcined into a light-grey calx, which is pretty refractory in the fire; but melts at last to a glass of a reddish-brown colour.
 d. It dissolves in spirit of sea-salt and aqua regia, but is only corroded by the spirit of nitre into a white calx; it is precipitated out of the aqua regia by water.
 e. It has an emetic quality when its calx, glass, or metal, is dissolved in an acid, except when in the spirit of nitre, which has not this effect.
 f. It amalgamates with quicksilver, if the regulus, when fused, is put to it; but the quicksilver ought for this purpose to be covered with warm water: it amalgamates with it likewise, if the regulus of antimony be previously melted with an addition of lime.

Antimony is found in the earth.

A. Native. *Regulus antimonii nativus*.

This is of a silver colour, and its texture is composed of pretty large shining planes.

This kind was found in Carls Ort, in the mine of Salberg, about the end of the last century; and specimens thereof have been preserved in collections under the name of an arsenical pyrites, until the mine-master Mr Von Swab discovered its real nature, in a treatise he communicated to the Royal Academy of Sciences at Stockholm in the year 1748. Among other remarkable observations in this treatise, it is said, first, That this native antimony easily amalgamated with quicksilver; doubtless, because it was imbedded in a limestone; since, according to Mr Pott's experiments, an artificial regulus of antimony may, by means of lime, be disposed to an amalgamation: Secondly, That when brought in form of a calx, it shot into crystals during the cooling.

B. Mineralised antimony.

(1.) With sulphur.

This is commonly of a radiated texture, composed of long wedge-like flakes or plates; it is nearly of a lead-colour, and rough to the touch.

- a. Of coarse fibres.
 b. Of small fibres.
 c. Steel-grained, from Saxony and Hungary.
 d. Crystallised, from Hungary.

1. Of a prismatical, or of a pointed pyramidal figure, in which last circumstance the points are concentrical.

Cronstedt mentions a specimen of this, in which the crystals were covered with very minute crystals or quartz, except at the extremities, where there was always a little hole: this specimen was given for a *flos ferri spar*.

(2.) With sulphur and arsenic. Red antimony ore; *Antimonium solare*.

This is of a red colour, and has the same texture with the preceding, though its fibres are not so coarse.

R

a. With

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- a. With small fibres.
- b. With abrupt broken fibres, from Braunsdorf in Saxony, and from Hungary.

All antimonial ores are somewhat arsenical, but this is more so than the preceding kinds.

- (3.) With sulphurated silver. Plumose silver-ore, or *federertz* of the Germans.
- (4.) With sulphurated silver, copper, and arsenic; the *dal fahl-ertz* of the Germans.
- (5.) With sulphurated lead; radiated lead-ore.
- (6.) By the aerial acid.

This ore was lately discovered by Mongez, among those of native antimony from the mine of Chalanges in Dauphiny. It consists of a group of white crystallised filaments of a needle-form appearance, diverging from a common centre, like zeolite. They are insoluble in nitrous acid; and, on being urged by the flame of a blow-pipe, upon a piece of charcoal, they are dissipated into white fumes, or antimonial flowers, without any smell of arsenic; from whence it follows, that these needle-formed crystals are a pure calx of antimony, formed by its combination with, or mineralised by, the aerial acid. See *Kirwan*, p. 325, and *Journal de Physique* for July 1787, p. 67.

Uses, &c. By the name of *antimony* is commonly understood the crude antimony (which is compounded of the metallic part and sulphur) as it melted out of the ore; and by the name of *regulus*, the pure semimetal.

1. Though the regulus of antimony is a metallic substance, of a considerably bright white colour, and has the splendor, opacity, and gravity of a metal, yet it is quite unmalleable, and falls into powder instead of yielding or expanding under the hammer; on which account it is classed among the semimetals.
2. Regulus of antimony is used in various metallic mixtures, as for printing types, metallic speculums, &c. and it enters into the best sort of pewter ware.
3. It mixes with, and dissolves various metals; in particular it affects iron the most powerfully; and, what is very remarkable, when mixed together, the iron is prevented from being attracted by the loadstone.
4. It affects copper next, then tin, lead, and silver; promoting their fusion, and rendering them all brittle and unmalleable: but it will neither unite with gold nor mercury; though it may be made to combine with this last by the interposition of sulphur. In this case it resembles the common *Æthiops*, and is thence called *antimonial Æthiops*.
5. Regulus of antimony readily unites with sulphur, and forms a compound of a very faint metallic splendor: it assumes the form of long needles adhering together laterally: it usually formed naturally also in this shape. This is called *crude antimony*.
6. But though antimony has a considerable affinity to sulphur; yet all the metals, except gold and mercury, have a greater affinity to that com-

pound. If therefore iron, copper, lead, silver, or tin, be melted with antimony, the sulphur will unite with the metal, and be separated from the regulus, which, however, takes up some part of the metal, for which reason it is called *martial regulus*, *regulus veneris*, &c.

7. When gold is mixed, or debased by the mixture of other metals, it may be fused with antimony; for the sulphur combines with the base metals, which, being the lighter, rise up into scoria, while the regulus remains united at the bottom with the gold; which being urged by a stronger degree of heat, is freed from the semimetal, which is very volatile. This method of refining gold is the easiest of all.
8. But the most numerous purposes to which this metal has been applied are those of the chemical and pharmaceutical preparations. Lemery, in his *Treatise on Antimony*, describes no less than 200 processes and formulæ; among which there are many good and many useless ones. The following deserve to be mentioned on account of their utility.
9. Antimony melts as soon as it is moderately red hot, but cannot sustain a violent degree of fire, as it is thereby dissipated into smoke and white vapours, which adhere to such cold bodies as they meet with, and are collected into a kind of farina or powder, called *flowers of antimony*.
10. If it be only moderately heated, in very small pieces, so as not to melt, it becomes calcined into a greyish powder destitute of all splendor, called *calx of antimony*. This calx is capable of enduring the most violent fire; but at last it will run into a glass of a reddish-yellow colour, similar to that of the hyacinth. The infusion made of this coloured antimonial glass, in acidulous wine (such as that of Bourdeaux) for the space of 5 or 6 hours, is a very violent emetic.
11. If equal parts of nitre and regulus of antimony be deflagrated over the fire, the grey calx which remains is called *liver of antimony*.
12. If regulus of antimony be melted with two parts of fixed alkali, a mass of a reddish-yellow colour is produced, which being dissolved in water, and any acid being afterwards added, a precipitate is formed of the same colour, called *golden sulphur of antimony*.
13. Fixed nitre, viz. the alkaline salt that remains after the deflagration of nitre, being boiled with small pieces of regulus of antimony, the solution becomes reddish; and, on cooling, deposits the antimony in the form of a red powder, called *mineral kermes*.
14. Equal parts of the glass, and of the liver of antimony, well pulverised and mixed with an equal quantity of pulverised cream of tartar, being put into as much water as will dissolve the cream of tartar, and boiled for 12 hours, adding now and then some hot water to replace what is evaporated, the whole is to be filtered while hot; then being evaporated to dryness, the saline matter that remains is the emetic tartar.
15. The regulus of antimony being pulverised, and distilled

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distilled with corrosive sublimate of mercury, a thick white matter is produced, which is extremely corrosive, and is called *butter of antimony*. This thick substance may be rendered limpid and fluid by repeated distillations.

16. On mixing the nitrous acid with this butter of antimony, a kind of aqua regia is distilled, called *bezoardic spirit of nitre*.

17. The white matter that remains from this last distillation may be redistilled with fresh nitrous acid; and the remainder being washed with water, is called *bezoar mineral*, which is neither so volatile nor so caustic as the antimonial butter. This butter being mixed with water, a precipitate falls to the bottom, which is very improperly called *mercurius vitæ*, for it is in fact a very violent emetic.

18. But if, instead of the regulus, crude antimony be employed, and the same operation be performed, the reguline part separates from the sulphur, unites to the mercury, and produces the substance which is called *cinnabar of antimony*.

19. Crude antimony being projected in a crucible, in which an equal quantity of nitre is fused, detonates; is calcined, and forms a compound called by the French *fondant de Retrou*, or *antimoine diaphoretique non lavé*. This being dissolved in hot water, falls to the bottom after it is cold; and after decantation is known, when dry, by the name of *diaphoretic antimony*. This preparation excites animal perspiration, and is a good sudorific. The same preparation may be more expeditiously made by one part of antimony with two and a half of nitre, mixed together and deflagrated: the residue of which is the mere calx of antimony, void of all emetic power.

20. And if the detonation be performed in a tubulated retort, having a large receiver, containing some water adapted to it, both a clyffus of antimony and the antimonial flowers may be obtained at the same time, as Neumann asserts.

21. When nitre is deflagrated with antimony over the fire, the alkaline basis of the nitre unites with the calx of the semimetal, which may be separated by an acid, and is called *materia perlata*. See farther the article ANTIMONY; also METALLURGY, Part II. sect. ix.

IV. Arsenic. In its metallic form, is,

a. Nearly of the same colour as lead, but brittle, and changes sooner its shining colour in the air, first to yellow, and afterwards to black.

b. It appears laminated in its fractures, or where broken.

c. Is very volatile in the fire, burns with a small flame, and gives a very disagreeable smell like garlic.

d. It is, by reason of its volatility, very difficult to be reduced, unless it is mixed with other metals: However, a regulus may be got from the white arsenic, if it is quickly melted with equal parts of pot ashes and soap; but this regulus contains generally some cobalt, most of the white arsenic being produced from the cobalt ores during their calcination. The white arsenic, mix-

ed with a phlogiston, sublimes likewise into octoedral crystals of a metallic appearance, whose specific gravity is 8,308.

e. The calx of arsenic, which always, on account of its volatility, must be got as a sublimation, is white, and easily melts to a glass, whose specific gravity is 5,000. When sulphur is blended in this calx, it becomes of a yellow, orange, or red colour; and according to the degrees of colour is called *orpiment* or yellow arsenic; *sandarach*, *realgar*, or red arsenic; and also *rubinus arsenici*.

f. This calx and glass are dissoluble in water, and in all liquids; though not in all with the same facility. In this circumstance arsenic resembles the salts; for which reason it also might be ranked in that class.

g. The regulus of arsenic dissolves in spirit of nitre; but as it is very difficult to have it perfectly free from other metals, it is yet very little examined in various menstrua.

h. It is poisonous, especially in form of a pure calx or glass: But probably it is less dangerous when mixed with sulphur, since it is proved by experience, that the men at mineral works are not so much affected by the smoke of this mixture as by the smoke of lead, and that some nations make use of the red arsenic in small doses as a medicine.

i. It unites with all metals, and is likewise much used by nature itself to dissolve, or, as we term it, to *mineralise*, the metals, to which its volatility and dissolubility in water must greatly contribute. It is likewise most generally mixed with sulphur.

k. It absorbs or expels the phlogiston, which has coloured glasses, if mixed with them in the fire.

Arsenic is found,

[1.] Native; called *Scherbencobolt* and *Fliegenstein* by the Germans.

It is of a lead colour when fresh broken, and may be cut with a knife, like black lead, but soon blackens in the air. It burns with a small flame, and goes off in smoke.

A. Solid and testaceous; *Scherbencobolt*.

B. Scaly.

C. Friable and porous; *Fliegenstein*.

(1.) With shining fissures.

This is by some called *Spigel cobolt*.

[2.] In form of a calx.

A. Pure, or free from heterogeneous substances.

1. Loose or powdery.

2. Indurated, or hardened. This is found in form of white semi-transparent crystals.

B. Mixed.

A. With sulphur.

1. Hardened.

a. Yellow. Orpiment; *Auripigmentum*.

b. Red. Native realgar, or sandarach.

B. With the calx of tin, in the tin-grains.

c. With sulphur and silver; in the *rothgulden* or red silver ore.

d. With calx of lead, in the lead-spar.

e. With calx of cobalt, in the efflorescence of cobalt.

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METALS,
Cobalt

[3.] Mineralised.

A. With sulphur and iron. Arsenical pyrites or marcasite. These kinds in Cornwall are called *silvery* or *white mundics* and *plate mundics*.

This alone produces red arsenic when calcined. It is of a deeper colour than the following.

B. With iron only. This differs with regard to its particles; being,

1. Steel-grained.
2. Coarse-grained.
3. Crystallised.

a. In an octoedral figure. This is the most common kind.

b. Prismatical. The sulphureous marcasite is added to this kind when red arsenic is to be made; but in Sweden it is scarcer than the sulphureous arsenical pyrites.

C. With cobalt, almost in all cobalt ores.

D. With silver.

E. With copper.

F. With antimony.

} See under *Silver, Copper,*
and *Antimony, supra.*

For the *Uses of Arsenic*, see the detached article ARSENIC, and CHEMISTRY-Index; also METALLURGY, Part II. sect. xiii. and Part III. sect. viii.

V. Cobalt.

This semimetal is,

a. Of a whitish grey colour, nearly as fine-tempered steel.

b. Is hard and brittle, and of a fine-grained texture; hence it is of a dusky, or not shining appearance.

c. Its specific gravity to water is 6000 to 1000.

d. It is fixed in the fire, and becomes black by calcination: it then gives to glasses a blue colour, inclining a little to violet, which colour, of all others, is the most fixed in fire.

e. The concentrated oil of vitriol, aquafortis, and aqua-regia, dissolve it; and the solutions become red. The cobalt calx is likewise dissolved by the same menstrua, and also by the volatile alkali and the spirit of sea salt.

f. When united with the calx of arsenic in a slow (not a brisk) calcining heat, it assumes a red colour: the same colour is naturally produced by way of efflorescence, and is then called the *bloom* or *flowers of cobalt*. When cobalt and arsenic are melted together in an open fire, they produce a blue flame.

g. It does not amalgamate with quiksilver by any means hitherto known.

b. Nor does it mix with bismuth, when melted with it, without addition of some medium to promote their union.

[1.] Native cobalt. Cobalt with arsenic and iron in a metallic form.

Pure native cobalt has not yet been found: that which passes for such, according to Kirwan, is mineralised by arsenic. Bergman, however, in his *Sciagraphia*, has entered this present ore under the denomination of *native cobalt*: and certain it is, that among all the cobaltic ores, this

is the nearest to the native state of this semimetal. It always contains a small quantity of iron, besides the arsenic, by which it is mineralised.

This is of a dim colour when broken, and not unlike steel. It is found,

a. Steel-grained, from Loos in the parish of Farila in the province of Helsingeland, and Schneeberg in Saxony.

b. Fine-grained, from Loos.

c. Coarse-grained.

d. Crystallised:

1. In a dendritical or arborescent form;
2. Polyhedral, with shining surfaces;
3. In radiated nodules.

[2.] Calciform cobalt. Cobalt is most commonly found in the earth mixed with iron.

A. In form of a calx.

1.) With iron without arsenic.

a. Loose or friable; cobalt ochre. This is black, and resembles the artificial zaffre.

b. Indurated: *Minera cobalti vitrea*. The schlacken or slag cobalt. This is likewise of a black colour, but of a glassy texture, and seems to have lost that substance which mineralised it, by being decayed or weathered.

2.) With arsenical acid; cobalt-blut, Germ. *Ochra cobalti rubra*; bloom, flowers, or efflorescence of cobalt.

a. Loose or friable. This is often found of a red colour like other earths, spread very thin on the cobalt ores; and is, when of a pale colour, erroneously called *flowers of bismuth*.

b. Indurated. This is commonly crystallised in form of deep red semitransparent rays or radiations: It is found at Schneeberg in Saxony.

B. Mineralised.

1.) With sulphurated iron.

This ore is of a light colour, nearly resembling tin or silver. It is found crystallised in a polygonal form.

a. Of a slaggy texture.

b. Coarse-grained.

This ore is found in Bastnäsgrufva at Raddarshyttan in Westmanland, and discovers not the least mark of arsenic. The coarse-grained becomes slimy in the fire, and sticks to the stirring hook during the calcination in the same manner as many reguli do: It is a kind of regulus prepared by nature. Both these give a beautiful colour.

2.) With sulphur, arsenic, and iron. This resembles the arsenicated cobalt ore, being only rather of a whiter or lighter colour. It is found,

a. Coarse-grained.

b. Crystallised;

1. In a polygonal figure, with shining surfaces, or *glanzkobalt*. It is partly of a white or light colour, and partly of a somewhat reddish yellow.

3.) With

SEMI-
METALS,
Cobalt.

SEMI-METALS.
Nickel.

3.) With sulphurated and arsenicated nickel and iron; see *Kupfer-nickel*, below.

Uses, &c. See the article COBALT. See also CHEMISTRY-Index; and METALLURGY, Part II. sect. xi.

VI. Nickel; *Niccolum*. This is the latest discovered semimetal. It was first described by its discoverer Mr Cronstedt, in the Acts of the Royal Academy of Sciences at Stockholm for the years 1751 and 1754, where it is said to have the following qualities:

1. It is of a white colour, which, however, inclines somewhat to red.
2. Of a solid texture, and shining in its fractures.
3. Its specific gravity to water is as 8,500 to 1000.
4. It is pretty fixed in the fire; but, together with the sulphur and arsenic, with which its ore abounds, it is so far volatile as to rise in form of hairs and branches, if in the calcination it is left without being stirred.
5. It calcines to a green calx.
6. The calx is not very fusible, but, however, tinges glass of a transparent reddish-brown or jacinth colour.
7. It dissolves in aquafortis, aqua-regia, and the spirit of sea-salt; but more difficultly in the vitriolic acid, tinging all these solutions of a deep green colour. Its vitriol is of the same colour; but the colcothar of this vitriol, as well as the precipitates from the solutions, become by calcination of a light green colour.
8. These precipitates are dissolved by the spirit of sal ammoniac, and the solution has a blue colour; but being evaporated, and the sediment reduced, there is no copper, but a nickel regulus is produced.
9. It has a strong attraction to sulphur; so that when its calx is mixed with it, and put on a scorifying test under the muffle, it forms with the sulphur a regule: this regule resembles the yellow steel-grained copper-ores, and is hard and shining in its convex surface.
10. It unites with all the metals, except quicksilver and silver. When the nickel regulus is melted with the latter, it only adheres close to it, both the metals lying near one another on the same plane; but they are easily separated with a hammer. Cobalt has the strongest attraction to nickel, after that to iron, and then to arsenic. The two former cannot be separated from one another but by their scorification; which is easily done, since,
11. This semimetal retains its phlogiston a long time in the fire, and its calx is reduced by the help of a very small portion of inflammable matter: it requires, however, a red heat before it can be brought into fusion, and melts a little sooner, or almost as soon, as copper or gold, consequently sooner than iron.

Nickel is found,

A. Native.

This is mentioned by Mr Rinman to have been lately met with in a mine of cobalt in Hesse.

It is very heavy, and of a liver colour, that is, dark red. When pulverised and roasted under a muffle, it forms green excrecences, and smokes; but its smoke has no particular smell: and no sublimate, whether sulphureous or arsenical, can be caught. It is soluble in acids, and the solution is green; but a polished iron plate discovers no copper.

B. In form of a calx. Nickel ochre, aerated nickel.

1. Mixed with the calx of iron. This is green, and is found in form of flowers on kupfer-nickel.

C. Mineralised.

1. With sulphurated and arsenicated iron and cobalt; *Kupfernickel*. This is of a reddish yellow colour; and is found,
 - a. Of a slaggy texture.
 - b. Fine-grained; and
 - c. Scaly. These two are often from their colour confounded with the liver-coloured marcasite.
2. With the acid of vitriol. This is of a beautiful green colour, and may be extracted out of the nickel ochre, or efflorescence of the Kupfernickel.

For a full account of this semimetal, see the article NICKEL, and CHEMISTRY-Index.

VII. Manganese. *Manganesum*.

The ores of this kind are in Swedish called *brunsten*; in Latin *sydereæ*, or *magnesia nigra*, in order to distinguish them from the *magnesia alba officinalis*; and in French *manganèse*, &c.

1. Manganese consists of a substance which gives a colour both to glasses and to the solutions of salts, or, which is the same thing, both to dry and to liquid menstrua, viz.
 - a. Borax, which has dissolved manganese in the fire, becomes transparent, of a reddish brown or hyacinth colour.
 - b. The microcosmic salt becomes transparent with it, of a crimson colour, and moulders in the air.
 - c. With the fixed alkali, in compositions of glass, it becomes violet; but if a great quantity of manganese is added, the glass is in thick lumps, and looks black.
 - d. When scorified with lead, the glass obtains a reddish brown colour.
 - e. The lixivium of deflagrated manganese is of a deep red colour.
2. It deflagrates with nitre, which is a proof that it contains some phlogiston.
3. When reckoned to be light, it weighs as much as an iron ore of the same texture.
4. When melted together with vitreous compositions, it ferments during the solution: but it ferments in a still greater degree when it is melted with the microcosmic salt.
5. It does not excite any effervescence with the nitrous acid: aqua-regia, however, extracts the colour out of the black manganese, and dissolves likewise a great portion of it, which by means of an alkali is precipitated to a white powder.

6. Such

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Manganese.

6. Such colours as are communicated to glasses by manganese, are easily destroyed by the calx of arsenic or tin: they also vanish of themselves in the fire.

7. It is commonly of a loose texture, so as to colour the fingers like soot, though it is of a metallic appearance when broken.

Manganese is found,

[1.] Native; of the discovery and qualities of which, an account is given under the article MANGANESE in its alphabetical order. See also CHEMISTRY-Index.

[2.] Calciform.

A. Loose and friable.

a. Black; which seems to be weathered or decayed particles of the indurated kind.

B. Indurated.

1.) Pure, in form of balls, whose texture consists of concentric fibres. *Pura spherica radiis concentratis.*

a. White; very scarce.

2.) Mixed with a small quantity of iron.

a. Black manganese, with a metallic brightness. This is the most common kind, and is employed at the glass-houses and by the potters. It is found,

1. Solid, of a slaggy texture.

2. Steel-grained.

3. Radiated.

4. Crystallised, in form of coherent hemispheres.

VIII. Molybdena.

A. Lamellar and shining, its colour similar to that of the potter's lead-ore.

This substance resembles plumbago or black-lead; and has long been confounded with it, even by Cronstedt. But it possesses very different properties; in particular,

1. Its laminæ are larger, brighter: and, when thin, slightly flexible. They are of an hexagonal figure.

2. It is of a lead colour, and does not strike fire with hard steel.

3. Its specific gravity is = 4,569, according to Kirwan; and 4,7385, according to Briffon.

4. When rubbed on white papper, it leaves traces of a dark brown or bluish colour, as the plumbago or black lead does; but they are rather of an argentine gloss; by which circumstance the molybdena, according to Dr d'Arcet, may be easily distinguished from black-lead, as the traces made by this last are of less brilliant, and of a deeper tinge.

5. In an open fire, it is almost entirely volatile and infusible. Microcosmic salt or borax scarcely affect it; but it is acted upon with much effervescence by mineral alkali, and forms with it a reddish mass, which smells of sulphur.

6. It consists of an acid of peculiar nature (see CHEMISTRY-Index.) united to sulphur. A small proportion of iron is commonly found in it, but this seems merely fortuitous: 100 parts of molybdena contain about 45 of this acid and 55 of sulphur.

7. It is decomposed either by detonation with nitre, or by solution in nitrous acid.

8. This acid is soluble in 570 times its weight of water in the temperature of 60; the solution reddens that of litmus, precipitates sulphur from the solution of liver of sulphur, &c. The specific gravity of the dry acid is 3,460.

9. This acid is precipitable from its solution in water by the Prussian alkali, and also by tincture of galls: the precipitate is reddish brown.

10. If this acid be distilled with three times its weight of sulphur, it produces molybdena.

11. The solution of this acid in water unites to fixed alkalies, and forms crystallisable salts; as it also does with calcareous earth, magnesia, and argil: these last combinations are difficultly soluble. It acts also on the base metals, and with them assumes a bluish colour.

12. This solution precipitates silver, mercury, or lead, from the nitrous acid, and lead from the marine, but not mercury.

13. It also precipitates barytes from the nitrous and marine acids, but no other earth. Molybdenous baroselenite is soluble in cold water.

14. This acid is itself soluble in the vitriolic acid by the assistance of heat; and the solution is blue when cold, though colourless while hot; it is also soluble in the marine acid, but not in the nitrous.

15. Molybdena tartar and ammoniac precipitate all metals from their solutions by a double affinity. Gold, sublimate corrosive, zinc, and manganese, are precipitated white; iron or tin, from the marine acid, brown; cobalt, red; copper, blue; alum and calcareous earth, white.

16. This acid has been lately reduced by Mr Hielm; but the properties of the regulus thus obtained are not yet published.

17. Mr Pelletier obtained also the regulus or molybdena, by mixing its powder with oil into a paste, and exposing it with powdered charcoal in a crucible to a very violent fire for two hours. See CHEMISTRY-Index, n° 14, 97.

18. This semimetal being urged by a strong fire for an hour, produces a kind of silvery flowers, like those of antimony.

19. Molybdena is said to be soluble in melted sulphur; which seems highly probable, as sulphur is one of its component parts.

See farther the article MOLYBDENA, and CHEMISTRY-Index.

IX. Wolfram. *Wolfranium, Spuma Lupi*, Lat. See the detached article WOLFRAM.

This mineral has the appearance of manganese, blended with a small quantity of iron and tin.

1. With coarse fibres.

a. Of an iron-colour, from Altenberg in Saxony. This gives to the glass compositions, and also to borax and the microcosmic salt, an opaque whitish yellow colour, which at last vanishes.

X. Siderite. } See those words in the order of the
XI. Saturnite. } alphabet.

A P P E N D I X.

Of Saxa and Petrifications.

THOUGH the Saxa, and fossils commonly called *Petrifications*, cannot, in strictness, be ranked in a mineral system, for the reasons formerly given; yet as these bodies, especially the latter, occupy so considerable a place in most mineral collections, and the former must necessarily be taken notice of by the miners in the observations they make in subterranean geography, it appeared proper to subjoin them in such an order as might answer the purpose for which they are regarded by miners and mineralogists.

Order I. SAXA. *Petra*.

These may be divided into two kinds.

1. Compound saxa, are stones whose particles, consisting of different substances, are so exactly fitted and joined together, that no empty space, or even cement, can be perceived between them; which seems to indicate, that some, if not all, of these substances have been soft at the instant of their union.

2. Conglutinated stones, are stones whose particles have been united by some cementitious substance, which, however, is seldom perceivable, and which often has not been sufficient to fill every space between the particles: in this case the particles seem to have been hard, worn off, and in loose, single, unfigured pieces, before they were united.

I. Compound saxa.

A. Ophites. Scaly limestone with kernels or bits of serpentine stone in it.

1. *Kolmord marble.* It is white and green.
2. *Serpentino antico*, is white, with round pieces of black steatites in it. This must not be confounded with the *serpentino verde antico*.
3. The *Haraldsfo marble*. White, with quadrangular pieces of a black steatites.
4. The *marmor pozzevera di Genova*. Dark green marble, with white veins. This kind receives its fine polish and appearance from the serpentine stone.

B. Stellsten or gestelsstein. Granitello.

1. Of distinct particles. In some of these the quartzose particles predominate, and in others the micaceous: in the last case it is commonly slaty, and easy to split.
2. Of particles which are wrapt up in one another.
 - a. Whitish grey.
 - b. Greenish.
 - c. Reddish.

C. Norrka. Murksten of the Swedes. *Saxum compositum mica, quartzo, et granato.* Appendix. SAXA.

1. With distinct garnets or shirl.
 - a. Light grey.
 - b. Dark grey.
 - c. Dark grey, with prismatical, radiated, or fibrous cockle or shirl.
2. With kernels of garnet-stone.
 - a. Of pale red garnet stone.

The first of this kind, whose slaty strata makes it commonly easy to be split, is employed for mill-stones, which may without difficulty be accomplished, if sand is first ground with them; because the sand wearing away the micaceous particles on the surfaces, and leaving the garnets predominant, renders the stone fitter for grinding the corn.

D. The whetstone, Cos. Saxum compositum mica, quartzo, et forsan argilla martiali in nonnullis speciebus.

1. Of coarse particles.
 - a. White.
 - b. Light grey.
2. Of fine particles.
 - a. Liver-brown colour.
 - b. Blackish grey.
 - c. Light grey.
 - d. Black. The table-slate, or that kind used for large tables and for school slates.
3. Of very minute and closely combined particles. The Turkey-stone*. This is of an olive colour, and seems to be the finest mixture of the first species of this genus. The best of this sort come from the Levant, and are pretty dear. The whetstone kinds, when they split easily and in thin plates, are very fit to cover houses with, though most of them are without those properties. * See V. (p. 86. col. 1.)

E. Porphyry; Porphyrites. Italarum porfido. Saxum compositum jaspide et felspatato, interdum mica et basalte (D). See the article PORPHYRY.

- a. Its colour is green, with light-green felspat, *Serpentino verde antico*. It is said to have been brought from Egypt to Rome, from which latter place the specimens of it now come.
- b. Deep red, with white felspat.
- c. Black, with white and red felspat.
- d. Reddish brown, with light red and white felspat.
- e. Dark grey, with white grains of felspat also. The dark red porphyry has been most employed for ornaments in building; yet it is not the only one known by the name.

(D) Great part of the hill of Bineves in Lochaber is composed of a kind of porphyry. It is remarkably fine, beautiful, and of an elegant reddish colour; "in which (says Mr Williams) the pale rose, the blush, and the yellowish white colours, are finely blended and shaded through the body of the stone; which is of a jelly-like texture, and is undoubtedly one of the finest and most elegant stones in the world. On this hill also is found a kind of porphyry of a greenish colour, with a tinge of brownish red. It is smooth, compact, and heavy; of a close uniform texture, but has no brightness when broken. It has angular specks in it of a white quartz substance."

name of *porfido*, the Italians applying the same name also to the black kind.

G. The *trapp* of the Swedes. *Saxum compositum jaspide martiali molli, seu argilla martiali indurata*. See the article TRAPP.

This kind of stone sometimes constitutes or forms whole mountains; as, for example, the mountain called *Hunneberg* in the province of Westergotland, and at Drammen in Norway; but it is oftener found in form of veins in mountains of another kind, running commonly in a serpentine manner, contrary or across to the direction of the rock itself. It is not homogeneous, as may be plainly seen at those places where it is not pressed close together; but where it is pressed close, it seems to be perfectly free from heterogeneous substances.—When this kind is very coarse, it is interspersed with felspat; but it is not known if the finer sorts likewise contain any of it. Besides this, there are also some fibrous particles in it, and something that resembles a calcareous spar; this, however, does not ferment with acids, but melts as easy as the stone itself, which becomes a black solid glass in the fire. By calcination it becomes red, and yields in assays 12 or more *per cent.* of iron. No other sort of ore is to be found in it, unless now and then somewhat merely superficial lies in its fissures; for this stone is commonly, even to a great depth in the rock, cracked in acute angles, or in form of large rhomboidal dice. It is employed at the glass-houses, and added to the composition of which bottles are made. In the air it decays a little, leaving a powder of a brown colour; it cracks commonly in the fire, and becomes reddish brown if made red-hot. It is found,

1. Of coarse chaffy particles.
 - a. Dark grey.
 - b. Black.
2. Coarse-grained.
 - a. Dark grey.
 - b. Reddish.

c. Deep brown.

3. Of fine imperceptible particles.

a. Black. The touchstone; *Lapis lydius*.

b. Bluish.

c. Grey.

d. Reddish.

The black variety (3. a.) is sometimes found so compact and hard, as to take a polish like the black agate: it melts, however, in the fire to a black glass; and is, when calcined, attracted by the load-stone.

H. *Amygdaloides*. The carpolithi or fruit-stone rocks of the Germans.

It is a martial jasper, in which elliptical kernels of calcareous spar and serpentine stone are included.

a. Red, with kernels of white limestone, and of a green steatites. This is of a particular appearance, and when calcined is attracted by the loadstone; it decays pretty much in the air, and has some affinity with the trapp, and also with the porphyry. There are sometimes found pieces of native copper in this stone.

I. The *gronsten* of the Swedes.

Its basis is hornblende, interspersed with mica. It is of a dark green colour, and in Smoland is employed in the iron furnaces as a flux to the bog-ore.

K. The granite. *Saxum compositum felspata, mica et quartzo, quibus accidentaliter interdum hornblende steatites, granatus et basaltis immixti sunt*. Its principal constituent parts are fels-spat, or rhombic quartz, mica, and quartz. See the article GRANITE.

It is found,

- (1.) Loose or friable. This is used at the Swedish brass-works to cast the brass in, and comes from France.
- (2.) Hard and compact.
 - a. Red.
 1. Fine-grained;
 2. Coarse-grained.
 - b. Grey, with many and various colours (E).

II. Con-

(E) Mr Wiegles has analysed a species of green granite found in Saxony. The crystals are heaped together, and form very compact layers; the colour sometimes an olive green, sometimes resembling a pear, and sometimes of a reddish brown; some of them being perfectly transparent, and others nearly so. According to Mr Warren, they contain 25 per cent. of iron; whence they have been called green ore of iron. An ounce of these crystals heated red hot in a crucible lost two grains in weight, and became of the colour of honey. The remainder was put into a retort, and distilled with marine acid, with which it evidently effervesced. The residuum was lixiviated with distilled water, fresh muriatic acid added, and the distillation and lixiviation repeated. The iron precipitated from this lixivium, and reduced partly to its metallic state, weighed two drachms. M. Wiegles concludes, that the specimen contained two drams $26\frac{1}{2}$ grains of lime. From further experiments he concludes, that 100 parts of the substance contained 36.5 of siliceous earth; lime 30.8; iron 28.7; and water and fixed air 4.0.

Scotland is remarkable for a great number of excellent granites, little or nothing inferior to porphyry. Of these the following kinds are mentioned by Mr Williams.

1. The grey granite, or *moor-stone* as it is called in Cornwall, is very common in this country. In some places it shows no marks of strata; and in others it is disposed in thick unwieldy irregular beds, which are commonly broken transversely into huge masses or blocks of various sizes and shapes. There is a great variety in this kind of stones; some of them differing but little in appearance from basaltis; others are composed of almost equal parts of black and white grains, about the size of small pease, whence it is called *peasy whin* by the

Appendix.
SAXA.

II. Conglutinated saxa.

A. Of larger or broken pieces of stones of the same kinds conglutinated together. *Breccia*.

1. Of limestone cemented by lime.

a. Calcareous breccia; the *marmi brecciati* of the Italians.

When these kinds have fine colours, they

are polished and employed for ornaments in architecture and other æconomical uses.

b. The *lumachella* of the Italians, or shell marbles. These are a compound of shells and corals, which are petrified or changed into lime, and conglutinated with a calcareous substance. When they have many colours, theyAppendix.
SAXA.

the common people. In Galloway and other places it frequently has a longitudinal grain, as if the component parts had been all moved one way by a gentle flow of water. When this kind of granite begins to undergo a spontaneous decomposition by exposure to the atmosphere, we observe that it is composed of pretty large grains of the figures of cubes, rhomboids, &c. some of them so large as to deserve the name of fragments; and the largest of these are always of quartz or feldspath, and talc.

2. Reddish granite, of a gellied texture, which, Mr Williams says, is one of the finest and most elegant stones in the world. The mountains of Bineves, he says, are principally composed of this stone; and it is found in great abundance in many other parts of Scotland, but he never saw it exhibit any marks of stratification.

3. The fine reddish granites, in which several fine shades of colours are blended together, not spread out in tints as in the former. Neither this nor the former are stratified: "On the contrary (says our author), both exhibit such a degree of uniform regularity, that in some places there is no difference between a stone and a mountain, excepting only in magnitude; as many mountains of granite are nothing more than one regularly uniform mass throughout, in which not the least mark of a bed is to be seen, nor hardly a crack or fissure, unless it be at the edge of some precipice or declivity. These two varieties of elegant red granite are met with in the Highlands and Lowlands of Scotland, in Galloway, and many other places. We often find masses of talc so large in this second variety, that some of them may be called fragments, not disposed in any order, but higgledy-piggledy through the body of the stone.

4. Stratified reddish granite, resembling the third in colour and quality, but not always quite so pure or free from admixture of other stony matter of a different quality. This variety frequently contains larger and smaller fragments of fine laminated talc. Mr Williams, however, has seen this kind of granite disposed in pretty regular strata in the shires of Moray and Nairn, and other parts of Scotland.

5. Granite of a white and whitish colour, generally of a granulated texture, containing a great quantity of mica, or small-leaved talc, and the grains of quartz sometimes large and angular. This variety is subject to spontaneous decomposition; part frequently dissolves and falls into lakes, in such an exceedingly fine and attenuated state, that it does not sink in the water. "I have found (says Mr Williams) this substance in many places where water had been accidentally drained off, resembling fine shell marle, only much lighter. When thoroughly dry, it is the lightest fossile substance I ever handled; and, when blanchied with rain, it is as white as snow. This variety of granite is either not stratified, or exhibits thick irregular beds. It frequently contains a considerable quantity of talc, in masses and scales too large to be called mica."

Our author is of opinion, that this fine white substance produced from the decomposition of the granite, is the true kaolin of the Chinese, one of the component parts of porcelain ware. "The authors of the History of China (says he) informs us, that the fine porcelain ware is composed of two different fossile substances, called by them *petuntse* and *kaolin*. We are further told, that the *petuntse* is a fine white vitrescible stone, compact and ponderous, and of considerable brightness in the inside when broken, which they grind to a fine powder; and that the *kaolin* is not a stone, but a fine white earthy substance, not vitrifiable, at least not in the heat of a common potter's furnace: that they mix the *kaolin* and the flour of the *petuntse* together, and form a paste of this mixture, which they mould into all sorts of porcelain vessels. Now, from the best accounts of this matter which I have been able to obtain, after a good deal of search and inquiry, it appears to me, that the sediment which I have mentioned above is the true kaolin; and that as the fine white glassy quartz, which is found in irregular masses, and in irregular discontinuous veins or ribs, in some of the rocks of schistus, is the true *petuntse*; and if this observation is really true, it deserves to be remarked, that Scotland is as well furnished with the best materials for making fine porcelain as most countries in the world. The species of quartz which I suppose to be *petuntse* is of a pure fine uniform glassy texture, semitransparent, and of a pure snowy whiteness. A broken piece of this stone, and a newly broken piece of fine porcelain, are very like one another. There is a great quantity of *petuntse*, or pure white quartz, in many places of Scotland, particularly in the north and Highlands. There is a considerable quantity of it upon the shore and washed by the tide between Banff and Cullen, generally in pretty large masses in rocks of bluish schistus; and to the best of my memory it is very fine of the kind. There is also a considerable quantity of it in discontinuous ribs and masses, in rocks of blue schist, about three or four miles north of Callendar in Monteith, upon the side of the high road which runs parallel to Lochleodunich, which I think also very fine. In some places this sort of quartz is tinged with a flesh colour from the neighbourhood of iron, which renders it unfit for porcelain; but there is plenty to be found of a pure white in almost all parts of Scotland, without any mineral tinge whatever. The *kaolin* is perhaps as plentiful in Scotland as the *petuntse*, there being many extensive lakes easily drained, which contain a considerable depth of it; and moreover, it is to be found in many places that have been lakes, which are now laid dry by accident. There is a quantity of kaolin about

- they are called *marbles*, and employed for the same purposes as the preceding (F).
2. Of kernels of jasper cemented by a jaspery substance. *Breccia jaspidea*. *Diaspro brecciato* of the Italians.

Of this kind specimens from Italy are seen in collections. A coarse jasper breccia is said to be found not far from Frejus in Provence in France.

3. Of siliceous pebbles, cemented by a jaspery substance,

100 yards below the high road upon the south side of a bridge, about a mile and a half or two miles south of the inn of Aviemore in the Highlands. It lies beneath a stratum of peat bog, in a place which has been a lake, but is now drained by the river Spey cutting through one side of the mound which formed the lake.—There is more than one stratum of the kaolin in this place, and some of it is exceeding white, especially when blanched by the rain; and there is a white granite rock up the rivulet, at some distance above the bridge, the decomposition and dissolution of which is supposed to produce this fine and curious sediment. Several lakes in the Highlands of Scotland are nearly full of kaolin. One of them is situated in the country of Stratherrick in Inverness-shire, less than a mile north of the public road, and upon the west side of the farm of Drimin. It is a pretty long lake, and there is a considerable depth of kaolin in it, which may be drained at a moderate expence; and, if I remember well, the granite rocks which surround it are pretty white and fine. If the kaolin originates from coloured granite, it is good for nothing, especially if it contains the least tinge of iron, because this will discolour and spoil the beauty of the porcelain; but wherever white granite is found composed of quartz, feldspath, and mica, without any admixture of shirl, and especially iron, the kaolin should be diligently sought after in that neighbourhood. Lochdoon, in Galloway, is said to contain a great quantity of kaolin. It was drained some years ago on the supposition of its containing shell marle; but on trying the substance contained in it, it was found not to be marle but kaolin. These substances may easily be mistaken for one another at first; but they are easily distinguished by trying them with acids, the marle readily effervescing with the weakest, and the kaolin not at all with the strongest acid liquors.”

6. Grey composite granite is a very beautiful stone, and when broken looks as if composed of small fragments of various sizes and shapes, not unlike calve's-head jelly. When polished, the fragments appear as if set or inlaid in a fine pellucid or water-coloured matter. There is a single stratum of very curious composite granite, a little to the west of Lossiemouth, in the county of Moray, in Scotland of about six or eight feet thick. It is composed chiefly of grains and fragments of various bright and elegant colours, most of which are as large as pease and beans, all fine, hard, and semipellucid; there is about an eighth part of good lead ore in the composition of this stone, of the kind commonly called potter's ore; and it is likewise remarkable, that there is no other granite in that neighbourhood but this single stratum, all the strata above and below it being mostly a coarse, imperfect, grey sand-stone.

7. Granite of a loose friable texture, subject to spontaneous decomposition, and reduction to granite gravel. There is a remarkable rock of this kind near the Queen's-ferry in Scotland, on the road to Edinburgh, which appears in prodigious thick irregular strata. This rock seems to be composed chiefly of quartz, shirl, and some iron; and produces excellent materials for the high roads.

8. In many parts of the north of Scotland, in the Highlands, and in Galloway, there is found an excellent species of grey granite, composed chiefly of red and black coloured grains. This is a fine and very durable stone, very fit for all kinds of architecture.

In speaking of these stones, Mr Williams observes, that the finer and most elegant red granites, and the finest granite-like porphyries, so much resemble one another, that he does not attempt to distinguish them; and Scotland is remarkable for a great number and variety of them. “The elegant reddish granite of Bineves, near Fort William (says he), is perhaps the best and most beautiful in the world; and there is enough of it to serve all the kingdoms on earth, though they were all as fond of granite as ancient Egypt. There are extensive rocks of red granite upon the sea-shore to the west of the ferry of Ballachulish in Appin, and likewise at Strontian, as well as many other parts of Argyleshire. I have seen beautiful red granite by the road side, near Dingwall, and in several other parts of the north of Scotland, which had been blown to pieces with gunpowder, and turned off the fields. There are extensive rocks of reddish granite about Peterhead and Slains, and both of red and grey granite in the neighbourhood of Aberdeen. The hill of Cruffel in Galloway, and several lower hills and extensive rocks in that neighbourhood, are of red and grey granite, where there are great varieties of that stone, and many of them excellent. Upon the sea shore near Kinnedore, west of Lossiemouth, in Moray, there is a bed of stone about eight feet thick, which I think should be called a composite granite. It is composed of large grains, or rather small pieces of bright and beautiful stones of many different colours; and all the stony parts are exceedingly hard, and fit to receive the highest polish. About a sixth or eighth part of it also consists of lead ore, of that species called potter's ore. The separate stony parts composing this stratum are all hard, fine, solid, and capable of the most brilliant polish; and if solid blocks can be raised free from all cracks and blemishes, I imagine, from the beauty and variety of colours of the stony part, and the quantity of bright lead ore which is blended through the composition and body of the stone, that this would be a very curious and beautiful stone when polished.”

(F) The stones called *Ludi Helmontii* or *Paracelsi*, have some similarity in their form to the *breccia*, a. b.: for they are composed of various lumps of a marly whitish-brown matter, separated into a great number of polygonous compartments, of various sizes, formed of a whitish-yellow crust of a red calcareous spar, some-

Appendix.
SAXA.Appendix.
SAXA.

substance, or something like it. The plum-pudding stone of the English; *Breccia filicea*. Its basis, which at the same time is the cement, is yellow; wherein are contained single flinty or agaty pebbles, of a grey colour or variegated. This is of a very elegant appearance when cut and polished: it is found in England and Scotland (e).

4. Of quartzose kernels combined with an unknown cement. *Breccia quartzosa*.
5. Of kernels of several different kinds of stones. *Breccia saxosa*.

a. Of kernels of porphyry, cemented by a porphyry or coarse jaspery substance; *Breccia porphyrea*.

b. Of kernels of several saxa; *Breccia indeterminata*.

c. Of conglutinated kernels of sandstone; *Breccia arenacea*. This kind consists of sandstone kernels, which have been combined a second time together.

The above mentioned breccia of themselves must demand the distinctions here made between, but which perhaps may seem to be carried too far,

times pyritous, which often rise a little above the external surface, and inclose each of them on the inside. According to Bomare, the *ludus stellatus belmontii*, found in the county of Kent, is covered with a kind of striated selenite resembling the zeolite. They are for the most part of a globose figure, seldom flat, but often convex on the outside; and sometimes with a concave surface.

According to Wallerius, the *ludus belmontii* loses by calcination about half of its weight; and, on being urged by fire, is melted into a black glassy slag. It effervesces strongly with aqua-fortis, and this solution is of a yellow colour. But what seems very extraordinary, by adding to it some oil of tartar *per deliquium*, bubbles are produced, from which a great number of slender black threads or filaments are produced, sticking like a cobweb to the sides and bottom of the vessel.

These stones are found quite separate by themselves, as well as various stalagmites and crustaceous bodies, on the strata of argillaceous earth, in various parts of Europe, chiefly in Lorrain, Italy, England (in the counties of Middlesex and Kent), and elsewhere.

Wallerius ranges the *ludus belmontii* among the *tophi*, in the Spec. 425. of his System of Mineralogy. Paracelsus had attributed to these stones a lithontriptic power, and Dr Grew says that they are diuretic; but there is not the least proof of their really possessing such qualities.

(G) The breccia stratum, or plumpudding-rock, exhibits a singular appearance as it lies in the ground; being composed of water-rounded stones of all qualities and of all sizes, from small gravel up to large rounded stones of several hundreds weight each; the interstices being filled up with lime and sand. It frequently also contains lime and iron. Sometimes it exhibits a grotesque and formidable appearance; containing many large bullets of various sizes and shapes, without any marks of regular stratification, but looking like one vast mass of bullets of unequal thickness; and in this manner frequently swelled to the size of a considerable mountain. It is frequently cemented very strongly together; so that parts of the hills composed of it will frequently overhang in dreadful precipices, less apt to break off than other rocks in the same situation; one reason for which, besides the strength of the cement, is, that the breccia, when composed of bullets, is less subject to fissures and cutters than other rocks; being frequently found in one solid mass of great extent and thickness. Some of the plumpudding-rocks are made up of smaller parts, coming near to the size of coarse gravel. It is evident, however, that all the parts of the breccia, whether coarse or fine, have been rounded by agitation in water, as the rocks differ nothing in appearance from the coarser and finer gravel found upon the beach of the sea, excepting only that the parts are strongly cemented together in the rocks, and are loose upon the shores of the ocean.

Some of the breccia is composed of finely rounded stones of various and beautiful colours, about the size of plums or nuts, all very hard and fine. Were this species sawed and polished, it would appear as beautiful and elegant as any stone in Europe; much resembling mosaic work in small patterns.

In general, the breccia is regularly stratified or not according to the size of the component parts of the stone. Such rocks as are composed of round gravel and small bullets are generally very regular in their stratification, while those which contain bullets somewhat larger in size are commonly disposed in thick and coarse beds, and such rocks as are made up of the largest kind of bullets seldom show any marks of stratification at all.

Among many other places in Scotland, where breccia or pudding-stone abounds, there are extensive rocks and high cliffs of it upon the south shore at the west end of the Pentland Frith, to the westward of Thurso in Caithness, which stretch quite across the county of Caithness into Sutherland; and in Sutherland as well as Caithness, this rock is of a rough contexture, and appears in pretty high hills, deep glens, overhanging rocks, and frightful precipices, to the west of Brora, Dunrobin, and Dornoch, which gives it a grotesque and formidable appearance in that country. This range of breccia stretches also quite through Sutherland, and likewise through Ross-shire, the west side of Ferndonald, and Dingwall, where it exhibits the very same phenomena as in Sutherland and Caithness. It continues the same longitudinal line of bearing, which is nearly from north-east to south-west, quite through the highland countries of Inverness and Perthshire; and it forms considerable hills, and very high and rugged rocks, upon both sides of that beautiful piece of fresh water Lochness. Much of the stone here, as well as in other places in this range, is composed of large bullets; the rock is very hard and strong, and it hangs in frightful precipices upon both sides of the lake, through which rock Ge-

far, since their particles are so big and plain as to be easily known from one another. These stones are a proof both of the subversions which the mountains in many centuries have undergone, and of some hidden means which nature makes use of in thus cementing different kinds of stones together. Any certain bigness for the kernels or lumps in such compounds, before they deserve the name of *breccia*, cannot be determined, because that depends on a comparison which every one is at liberty to imagine. In some places, the kernels of porphyry have a diameter of six feet, while in others they are no bigger than walnuts. Sometimes they have a progressive size down to that of a fine sandstone. Most of this kind of stone is fit for ornaments, though the workmanship is very difficult and costly.

B. Conglutinated stones of granules or sands of different kinds. Sandstone; *Lapis arenaceus*.

In this division are reckoned those which consist of such minute particles, that all of them cannot easily be discovered by the naked eye. The greatest part, however, consist of quartz and mica; which substances are the most fit to be granulated, without being brought to a powder.

1. Cemented by clay.

a. With an apyrous or refractory clay. This is of a loose texture; but hardens, and is very refractory in the fire.

b. With common clay.

2. With lime; resembles mortar made with coarse sand.

a. Consisting of transparent and greenish grains of quartz and white limestone.

b. Of no visible particles. This is of a loose texture, and hardens in the air.

3. With an unknown cement.

a. Loose.

b. Harder.

c. Compact.

d. Very hard.

4. Cemented by the rust or ochre of iron. Is found in form of loose stones at several places, and ought perhaps to be reckoned among the *minera arenacea* or sand ores; at least when the martial ochre makes any considerable portion of the whole.

5. Grit-stone. This is of greater or less hardness, mostly of a grey, and sometimes of a yellowish colour; composed of a siliceous and micaceous sand, and rarely of a sparry kind, with greater or lesser particles closely compacted and united by an argillaceous cement. It gives some sparks with steel, is indissoluble for the most

part in acids, and vitrifiable in a strong fire. Appendix. It is used for millstones and whetstones, sometimes for filtering stones and for building. *Fabroni*. SAXA.

N. B. The *argillaceous* grit has been before described, p. 89. col. 1.

6. Elastic. A singular species of sandstone, of which a specimen was shown some years ago to the Royal Academy of Sciences at Paris by the Baron de Dietrich. It is flexible and elastic; and consists of small grains of hard quartz, that strike fire with tempered steel, together with some micaceous mixture. The elasticity seems to depend on the micaceous part, and softness of the natural gluten between both. It is said, that this elastic stone was found in Brazil, and brought to Germany by his excellency the Marquis de Lavradio.

There are also two tables of white marble, kept in the palace Borgheze at Rome, which have the same property. But the sparry particles of their substance, though transparent, are rather soft; may be easily separated with the nail, and effervesce with aqua-fortis; and there is also in it a little mixture of small particles of talc or mica. See *Journ. de Phys.* for Oct. 1784, p. 275. See also the article MARBLE (*Elastic*.)

C. Stones and ores cemented together; *Minera arenacea*.

1. Of larger fragments.

a. Mountain green, or *viride montanum cupri*, and pebbles cemented together, from Siberia.

b. Potters lead-ore, with limestone, slate-kernels, and shells.

c. Yellow or marcasitical copper ore, with small pebbles.

2. Of smaller pieces.

a. Potter's lead-ore with a quartzose sand.

b. Mountain green with sand from Siberia.

c. Cobalt ore with sand.

d. Martial ochre with sand.

Order II. MINERAL CHANGES, OR PETRIFICATIONS.

THESE are mineral bodies in the form of animals or vegetables, and for this reason no others belong to this order than such as have been really changed from the subjects of the other two kingdoms of nature.

I. Earthy changes; *Terra larvata*.

A. Extraneous bodies changed into a lime substance, or calcareous changes; *Larva calcarea*.

(1.) Loose or friable. Chalky changes; *Creta larvata*.

a. In

neral Wade cut a fine military road upon the south side of the lake, at a great expence of time, labour, and gunpowder. These rocks are seen stretching through the mountains of Stratherig into Badenoch, where it forms a remarkable rock and precipice called *Craigdow* or the *Black Rock*. The same range is again seen farther towards the south-west, in several places to the south of the Black Mount, and in the country of Glenorchy in Argyleshire: and Mr Williams supposes, that the longitudinal line of this rock, so far as it has been just pointed out, is little less than 200 miles, and in some places it spreads eight or ten miles in what may be called the latitudinal line across the bearing of the rocks.

- a. In form of vegetables.
- b. In form of animals.
 - 1. Calcined or mouldered shells; *Humus cor- chaceus*.

(2.) Indurated; *Petrifac̃ta calcarea*.

- a. Changed and filled with solid limestone.

- 1. In form of animals.
- 2. In form of vegetables.

- b. Changed into a calcareous spar; *Petrifac̃ta calcarea spatosa*.

- 1. In form of animals.
- 2. In form of vegetables.

B. Extraneous bodies changed into a stony substance. Siliceous changes; *Larvæ siliceæ*. These are, like the flint,

(1.) Indurated.

- a. Changed into flints.

- 1. Carnelians in form of shells, from the river Tonn in Siberia.
- 2. Agat in form of wood. Such a piece is said to be in the collection of Count Tessin.
- 3. Coralloids of white flint, (*Millepora*.)
- 4. Wood of yellow flint.

C. Extraneous bodies changed into clay. Argillaceous changes; *Larvæ argillaceæ*.

- A. Loose and friable.

- 1. Of porcelain clay.

- a. In form of vegetables.

A piece of white porcelain clay from Japan, with all the marks of the root of a tree, has been observed in a certain collection.

- B. Indurated.

- 1. In an unknown clay.

- a. In form of vegetables. *Osteocolla*. It is said to be changed roots of the poplar tree, and not to consist of any calcareous substance.

A sort of fossil ivory is said to be found, which has the properties of a clay; but it is doubtful if it has been rightly examined.

II. Saline extraneous bodies, or such as are penetrated by mineral salts. *Corpora peregrina insalita. Larvæ insalitaæ*.

- A. With the vitriol of iron.

- 1. Animals.

- a. Human bodies have been twice found in the mine at Falun in Dalarne; the last was kept a good many years in a glass-case, but began at last to moulder and fall to pieces.

- 2. Vegetables.

- a. Turf, and

- b. Roots of trees.

These are found in water strongly impregnated with vitriol. They do not burn with a flame, but only like coal in a strong fire; neither do they decay in the air.

III. Extraneous bodies penetrated by mineral inflammable substances, or mineral phlogiston.

- A. Penetrated by the substance of pit-coals.

- 1. Vegetables, which commonly have been woods, or appertaining to them.

- a. Fully saturated. *Gagas*, Jet. (See p. 104. Appendix. col. 2.) The jet is of a solid shining texture.
- b. Not perfectly saturated; *Mumia vegetabilis*. It is loose; resembles umber, and may be used as such.

B. Penetrated by rock-oil or asphaltum.

- 1. Vegetables.

- a. Turf.

The Egyptian mummies cannot have any place here, since art alone is the occasion that those human bodies have in length of time been penetrated by the asphaltum, in the same manner as has happened naturally to the wood in pit-coal strata. See MUMMY.

C. Penetrated by sulphur which has dissolved iron, or by marcasite and pyrites. *Pyrite impregnata. Petrifac̃ta pyritacea*.

- 1. Animals.

- a. Human.
- b. Bivalves.
- c. Univalves.
- d. Insects.

IV. Metals in form of extraneous bodies; *Larvæ metalliferæ*.

- A. Silver; *Larvæ argentiferæ*.

- (1.) Native.

- a. On the surfaces of shells.

- (2.) Mineralised with copper and sulphur.

- a. Fahlertz, or grey silver ore in form of ears of corn, &c. and supposed to be vegetables, are found in argillaceous slate at Frankenberg and Tahlitteren in Hesse.

- B. Copper; *Larvæ cupriferaæ*.

- (1.) Copper in form of calx.

- a. In form of animals, or of parts belonging to them.

- 1. Ivory and other bones of the elephant. The Turcois or Turquoise; which is of a bluish green colour, and much valued in the east.

At Simore in Languedoc bones of animals are dug, which during the calcination assume a blue colour; but it is not probable that the blue colour is owing to copper.

- (2.) Mineralised copper, which impregnates extraneous bodies; *Cuprum mineralisatum corpora peregrina ingressum*.

- A. With sulphur and iron. The yellow or marcasitical copper ore that impregnates,

- 1. Animals.

- a. Shells.

- b. In form of fish.

- B. With sulphur and silver. Grey silver ore or fahlertz, like ears of corn, from the slate-quarries in Hesse.

C. Changes into iron; *Larvæ ferriferæ*.

- (1.) Iron in form of calx, which has assumed the place or the shape of extraneous bodies; *Ferrum calciforme corpora peregrina ingressum*.

- a. Loose; *Larvæ ochraceæ*.

- 1. Of vegetables.

Roots of trees, from the lake Langelma in Finland. See the acts of the Swedish Academy of Sciences for the year 1742.

- b. Indurated.

- b. Indurated; *Larvæ hematitica*.
 1. Of vegetables.
 (2.) Iron mineralised, assuming the shape of extraneous bodies.
 a. Mineralised with sulphur. Marcasite. *Larvæ pyritacea*.
- V. Extraneous bodies decomposing, or in a way of destruction; *Corpora peregrina in gradibus destructionis considerata*. Mould; *Humus*. Turf; *Turba*.
 A. From animals. Animal-mould; *Humus animalis*.
 1. Shells. *Humus conchaceus*.
 2. Mould of other animals; *Humus diversorum animalium*.
 B. Vegetable mould; *Humus vegetabilis*.
 1. Turf; *Turba*.
 a. Solid, and hardening in the air; *Turba solida aere indurescens*. This is the best of the kind to be used for fuel, and comes nearest to the pit-coals. It often contains a little of the vitriolic acid.
 b. Lamellated turf; *Turba foliata*. This is in the first degree of destruction.
 2. Mould of lakes; *Humus lacustris*. This is a black mould which is edulcorated by water.
 3. Black mould; *Humus ater*. This is universally known, and covers the surface of that loose earth in which vegetables thrive best.

Order III. VOLCANIC PRODUCTS (H).

I. SLAGS; *Scoria vulcanorum*.

Slags are found in great abundance in many places of the world, not only where volcanoes yet exist, but likewise where no subterraneous fire is now known: Yet, in Mr Cronstedt's opinion, they cannot be produced but by means of fire. These are not properly to be called *natural*, since they have marks of violence, and of the last change that mineral bodies can suffer without the destruction of the world; nor are they *artificial*, according to the universally received meaning of this word. We cannot, however, avoid giving them a place here, especially after having admitted the petrifications; and shall therefore arrange the principal of them, according to their external marks.

A. Iceland agate; *Achates islandicus niger*.

It is black, solid, and of a glassy texture; but in thin pieces it is greenish and semitransparent like glass-bottles, which contain much iron. The most remarkable circumstance is, that such large solid masses are found of it, that there is no possibility of producing the like in any glass-house.

It is found in Iceland, and in the island of Ascension: The jewellers employ it as an agate, though it is too soft to resist wear.

B. Rhenish millstone; *Lapis molaris Rhenanus*.

Is blackish-grey, porous, and perfectly resembles

a sort of slag produced by mount Vesuvius. A variety of lava, according to Kirwan.

C. Pumice-stone; *Pumex*.

It is very porous and blistered, in consequence of which it is specifically very light. It resembles that frothy slag which is produced in our iron furnaces.

1. White.

2. Black.

The colour of the first is perhaps faded or bleached, because the second kind comes in that state from the laboratory itself, viz. the volcanoes.

D. Pearl slag; *Scoria constantes globulis vitreis conglomeratis*.

It is compounded of white and greenish glass particles, which seem to have been conglutinated while yet soft or in fusion. Found on the Isle of Ascension.

E. Slag-sand or ashes; *Scoria pulverulenta, cineres vulcanorum*.

This is thrown out from volcanoes in form of larger or smaller grains. It may perhaps be the principle of the Terra Puzzolana; because such an earth is said at this time to cover the ruins of Herculaneum near Naples, which history informs us was destroyed by a volcano during an earthquake.

II. Lavas.

Lava has been generally understood to denote the aggregate mass of melted matters which flow out of the mouths, or burst out from the sides, of burning mountains. According to Mr Kirwan, however, lavas are the immediate produce of liquefaction or vitrification by the volcanic fires, and "should carefully be distinguished from the subsequent productions affected by the water either in a liquid or fluid state, which generally is ejected at the same time." And of lavas, so distinguished, he describes several varieties. See the article *LAVA*, in the order of the alphabet; where the nature, origin, kinds, and phenomena of lavas, are copiously described and explained.

III. Basaltes.

This sort of stone was by Cronstedt, in the first edition of his Mineralogy, ranked among the garnet earths, and confounded with the shoerls; an impropriety which was pointed out by Bergman in his *Sciagraphia*, sect. 120.—Mr Kirwan considers basaltes as an imperfect lava, and ascribes its origin both to fire and water. He describes it as found, either, 1. In opaque triangular or polyangular columns; which is the proper basaltes: Or, 2. In amorphous masses of different magnitudes; forming solid blocks, from the smallest size to that of whole mountains; which kind is called *trapp*. See the detached article *BASALTES* (1); where its species and varieties

(H) For the nature, history, theory, &c. of volcanoes, see the article *VOLCANO*.

(1) In that article, p. 46. col. 1. l. 9. *dele* the words, "The English miners call it *cockle*, the German *schœrl*."—P. 47. col. 2. l. 28. for "a kind of marble," read "a volcanic production." The *Lapis Lydius*, or *Touchstone*, mentioned in the same paragraph, should have been specified to be of the sort called *Trapp*.

rieties are particularly described, and different opinions stated concerning its formation. See also the article TRAPP.—Some plausible arguments against the volcanic origin of basaltes will

be mentioned in the course of the subjoined note (κ), extracted from *Williams's Natural History of the Mineral Kingdom*.

(κ) There is a great variety of basaltes in Scotland, particularly of the grey kinds; some of which are capable of the highest degree of polish. A good black kind is met with on the south side of Arthur's Seat near Edinburgh, where it forms a smooth perpendicular rock, with several of the columns broken off, and the suspended pieces threatening to fall down upon the passengers below. This stone is capable of receiving a fine polish; and, in the opinion of Mr Williams, would be fit for all sorts of ornaments about sepulchral monuments. It will polish to a bright and beautiful black, which will be unfading.

There is another kind, heavy and hard, of a black or blackish-grey colour; of which great quantities have been carried from the Frith of Forth to pave the streets of London. This, for the most part, is coarsely granulated in the inside, though sometimes the grain is pretty fine. Sometimes it is bright in the inside when broken. It is composed of grains of quartz and shirl of different sizes, and commonly contains some iron. It always appears in thick, irregular, beds, some of which are enormously thick; and seldom or ever equally so: on the contrary, where it is found uppermost, it frequently swells into little hills of various sizes. Most of the small islands in the Frith of Forth are composed of this kind of stone; as well as some hills in the neighbourhood of Inverkeithing and of Edinburgh.

The known characteristic of the basaltes is to form itself into balls, columns, and other regular figures. The columnar kind assumes a pentagonal, hexagonal, or heptagonal figure; but quadrangular columns are not common. They are all smooth on the outside, and lie parallel and contiguous to one another; sometimes perpendicular, sometimes inclining, in proportion to the position of the stratum which is thus divided: If the stratum lies horizontal, the columns are perpendicular; if inclining, the pillars also incline in exact proportion to the declivity of the strata, being always broken right across the stratum. Some are of one piece from top to bottom; others divided by one or more joints laid upon one another, which form a column of several parts. The rock called the *Giant's Causeway* in Ireland is a pretty good specimen of the jointed columnar basaltes: but there is a more beautiful species above Hillhouse lime-quarry, about a mile south of Linlithgow in Scotland; and a coarser one near the toll-bar north side of Queen's Ferry, and several other places in Fife. In some places the basaltes are formed into magnificent columns of great length; and in others afford an assemblage of small and beautiful pillars resembling a range of ballustrades or organ pipes. Some of the columns on the south side of Arthur's Seat already mentioned are very long; and there are likewise magnificent columns of great length in the island of Egg, and others of the Hebrides. These columns, when broken, are frequently of a black, or blackish grey, in the inside; some of them being composed of small grains, which gives them an uniform and smooth texture; but much of this species of stone has larger grains in its composition, rough, sharp, and unequal, when broken. All the grains, however, are fine, hard, and bright; and the stone in general is capable of a fine polish.

The other species of basaltes which forms itself into distinct masses, assumes sometimes a quadrangular, sometimes an oval, globular, or indeterminate figure. They are found of all sizes from the size of an egg to that of an house: but though they differ in shape from the columnar basaltes, they agree in almost every other respect; whence Mr Williams thinks that they are only to be accounted a variety of the columnar kind. It is common to see one stratum of the basaltine rocks exhibiting, in one place, regular pillars or globes; and near these, very irregular ones, differing very little from the common cutters found in all rocks; and at no great distance, the same rock is found to run into one entire mass, exhibiting no tendency to be broken or divided into any columns whatever. Of this the rock of Arthur's Seat is an instance. Some of these only produce solid masses of different figures and sizes; while others produce quantities of a softer, friable, stony matter, of the same quality in which the hard masses of different figures are found imbedded. Pretty good specimens of the second kind or variety of basaltes are met with on the road-side between Cramond bridge and the Queen's Ferry, and in several other places in the Lothians and in Fife.

The crusted basaltes are of two kinds; 1. Such as have the crusts more dry and friable than the internal parts; and, 2. Such as are dry and friable throughout the whole mass.

The first of these has not only a crust of the friable matter adhering to it, but is likewise imbedded in a quantity of the same. Our author has seen many quarries of this kind of basaltes dug for the high roads, in which the quantity of soft friable matter greatly exceeded that of the hard masses, and in which incruusted stones of various sizes and shapes appeared. In such quarries, some of the largest masses have only a few coats of penetrable friable matter, surrounding a nucleus which varies in size, but is uniformly hard throughout; and we shall find other yolks in the same quarry imbedded in the softer matter, which, when broken, exhibit a nest of stones including one another like the several coats of an onion. These crusted basaltes which envelope one another are a curious species of stone. The several coats of surrounding matter differ nothing in quality from the stones contained in them, and some of the inner crusts are often very hard; but the nucleus within, though small, is always the hardest. The decomposition by the weathering of the softer matter found surrounding and enveloping the harder masses of stone in this and the second species

Appendix. cies of basaltine rocks, has produced a phenomenon frequently met with in Great Britain, especially in *Appendix.*
VOLCANIC Scotland, which greatly puzzles many. It is very common in low grounds, and upon some moderate emi- *VOLCANIC*
PRODUCTS nences, to see a prodigious multitude of stones of all shapes and sizes, very hard, and pretty smooth on the *PRODUCTS*
 outside. These stones are sometimes so numerous and large, that it is often found impracticable to clear a field of them. Where those stones are a species of basalt, which they commonly are, and of the second species of basalt described above, they alway originate from a decomposition of the more soft or friable parts of those rocks, which moulder or fall away, and leave the harder stones detached and scattered about, and the decomposed matter dissolves by degrees, and becomes good corn mould.

Here Mr Williams takes occasion to contest the opinion of those who think that stones grow or vegetate like plants. He owns indeed that they increase in bulk: but this, he says, is only in such situations as are favourable for an accretion of matter carried down and deposited by the water; in all other situations they grow less and less. "Others (says he) imagine, that these stones (on which this extraneous matter has been deposited) were rolled about; that the asperities and sharp angles were by that means worn off; and that they were all at last deposited as we see them, by the waters of the universal deluge: and, having their obtuse sides and angles, as if they had been rounded by rolling in water, makes these gentlemen confident that they are right; and if we did not frequently find stones exactly of the same figure, size, and quality in the rock, it would be very difficult to overthrow this hypothesis. I have taken great pains to investigate this point, having frequently examined circumstances; and never failed to discover the stratum of rock which those detached stones originally belonged to. "The strata or beds of the several species of basalt spread as wide, and stretch as far, as the other concomitant strata in the neighbourhood where they are found: but they often lie very flat, or with a moderate degree of declivity; and consequently, when the softer and more friable matter found in the interstices of these rocks, which incloses and binds the harder masses in their native beds, is decomposed, the harder stones must then lie scattered wide upon the face of the ground."

The second species of the crustated basalt, viz. that which is dry and friable throughout the whole mass, is generally of a coarse and granulated texture, and of all the various shades of grey colours; from a rusty black to a light-coloured grey. This kind of crustated basalt is developed when the masses are either broken or in a state of decomposition; and there are masses of it of all sizes and shapes found in the rocks, resembling the second and third species of the basalt; appearing alike smooth on the outside, with obtuse angles; in short, resembling the basalt in every respect: but when they are exposed to the external air and weather for any considerable time, the several incrustations decay, decompose, and crumble down by degrees. When they quarry this species of basalt for the roads, they are able to break and pound them small with ease; but the harder species are so hard and cohesive, that they are with the greatest difficulty broken into sufficiently small parts.

Composite basalt resembles the three last species, in figure, colour, and all other external appearances; being distinguishable from them only in the internal structure or grain of the stone. It resembles some of the granites, as consisting of much larger grains than the other basalts. Many of the larger grains in the composite basalt are more than an eighth part of an inch over, and some more than a fourth; appearing with smooth flat surfaces, and of a tabulated texture, exactly resembling the quartz grains so commonly found in the composition of most of the granites. The chief, if not the only, distinguishable difference between the grains in each of them is the colour. They are evidently large grains of quartz, &c. which exhibit flat shining surfaces in both. Those grains or fragments are commonly white, yellowish, red, or black, in the composition of most of the granites; whereas they are often seen of a pale blue, or a bluish grey colour, in the composite basalt, and some of them approaching to white. It is only in the internal structure, however, that these basalts have any resemblance to the granites; in all the external characters, they differ nothing from the rest of their own genus.

A fifth species of basalt is indurated through the whole stratum, solid and uniform through all its parts, and exhibiting only such cracks and fissures or cutters as are commonly met with in other hard beds of stones. Many beds of this species are frequently met with in the coal-fields, and the miners are often obliged to sink through them in their coal-pits. "The Salisbury craigs at Edinburgh (says our author) might be singled out as a good example of this species of stone, were it not that part of the same stratum is formed into columns on Arthur's seat; though, I believe, this is no good exception, as it evidently appears that the beds of basalt which are formed into columns, glebes, &c. only assume these figures where they are exposed to the influence of the external air, or have but little cover of rock above them. When any of those beds strike deep under the cover of several other strata, they are not found in columns, &c. Nothing but an uniform mass then appears, although the same bed is regularly formed near the surface; which proves that the columnar and other basalts are formed by shrinking and chapping.

"The strata of basalt spread as wide, and stretch as far in the longitudinal bearing, as the other different strata which accompany them in the countries where they are found. The rocks of basalt also are generally found in very thick strata; and that generally in places where no other rock is found above the basalts, the strata of it are often very unequal in thickness. But this, in general, is only in situations where no other rock is found above it; for when it fairly enters into the surface of the earth, so as to have other regular strata above it, which is seen in an hundred places in the Lothians, Fife, and other parts of Scotland, it then appears pretty equal in thickness, as equal as most other beds of such great thickness are; and yet it is remarkable, that although most of the strata of basalt are of great thickness, there are frequently thin

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strata of various kinds found both above and below it. We have numerous examples of this in all the parts of Scotland where basalt is found; as for instance, there are thin and regular strata seen and quarried both above and below the thick bed of that rock in the Salisbury craigs near Edinburgh. In the Bathgate hills, south of Linlithgow, and in many other parts of Scotland, there are several strata of basalt, and likewise of coal, limestone, freestone, and other concomitants of coal blended promiscuously *stratum super stratum*; and the basalt is frequently found immediately above, and immediately below regular strata of coal; of course basalt is *not* the lava of volcanoes. We can prove to ocular demonstration, from the component parts, and from the situation, stretch, and bearing of the strata of basalt, that they are real beds of stone, coeval with all the other strata which accompany them; and are blended with them in the structure of that part of the globe where they are found, as they dip and stretch as far every way as the other strata found above and below them. If basalt, therefore, be a volcanic production, the other strata must of necessity be so likewise. But how volcanoes should produce coal, and how that coal should come into contact with burning lava, is not a little problematical; or rather it is strangely absurd to imagine that burning lava can come into contact with coal without destroying it.

The regularly stratified quartz white-mountain rock is scarce or rather not to be found in most parts of Britain. In the Highlands, however, it is very common; and in some places of them Mr Williams has seen it stratified as regularly as any of the sand-stones, with other regular strata of different qualities immediately above and below it; and sometimes composing large and high mountains entirely of its own strata. This stone is exceedingly hard, dry, and brittle, full of cracks and sharp angles; the different strata sometimes moderately solid, but often naturally broken into small irregular masses, with angles as sharp as broken glass, and of an uniformly fine and granulated texture, resembling the finest sugar-loaf. There are large and high mountains of this stone in Rosshire and Invernesshire, which, in a clear day, appear at a distance as white as snow, without any sort of vegetation on them except a little dry heath round the edge of the hill.

M I N

Minerva.

MINERVA, or PALLAS, in Pagan worship, the goddess of sciences and of wisdom, sprung completely armed from Jupiter's brain; and on the day of her nativity it rained gold at Rhodes. She disputed with Neptune the honour of giving a name to the city of Athens; when they agreed that whosoever of them should produce what was most useful to mankind, should have that advantage. Neptune, with a stroke of his trident, formed a horse; and Minerva caused an olive to spring from the ground, which was judged to be most useful, from its being the symbol of peace. Minerva changed Arachne into a spider, for pretending to excel her in making tapestry. She fought the giants; favoured Cadmus, Ulysses, and other heroes; and refused to marry Vulcan, choosing rather to live in a state of celibacy. She also deprived Tiresias of sight, turned Medusa's locks into snakes, and performed several other exploits.

Minerva is usually represented by the poets, painters, and sculptors, completely armed, with a composed but agreeable countenance, bearing a golden breast-plate, a spear in her right-hand, and her ægis or shield in the left, on which is represented Medusa's head encircled with snakes, and her helmet was usually entwined with olives.

Minerva had several temples both in Greece and Italy. The usual victim offered her was a white heifer, never yoked. The animals sacred to her were the cock, the owl, and the basilisk.

MINERVÆ *Castrum*, *Arx Minervæ*, *Minervium*, or *Templum Minervæ*, (anc. geogr.), a citadel, temple, and town on the Ionian sea, beyond Hydrus; seen a great way out at sea. Now *Castro*, a town of Otranto in Naples. E. Long. 19. 25. N. Lat. 46. 8.

MINERVÆ *Promontorium* (anc. geogr.), the seat of the Sirens, a promontory in the Sinus Paestanus, the south boundary of Campania on the Tuscan coast; so called from a temple of Minerva on it; situated to the

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M I N

south of Surrentum, and therefore called *Surrentinum*. Now *Capo della Minerva*, on the west coast of Naples, over-against the island Capri. Minervalia
Mingrelia.

MINERVALIA, in Roman antiquity, festivals celebrated in honour of Minerva, in the month of March; at which time the scholars had a vacation, and usually made a present to their masters, called from this festival *Minerval*.

MINGRELIA, anciently COLCHIS, a part of Western Georgia, in Asia; bounded on the east by Iberia, or Georgia properly so called; on the west, by the Euxine Sea; on the south, by Armenia, and part of Pontus; and on the north, by Mount Caucasus.

Colchis, or Mingrelia, is watered by a great many rivers; as the Corax, the Hippius, the Cyaneus, the Charitus, the Phasis, where the Argonauts landed, the Absarus, the Cissa, and the Ophis, all emptying themselves into the Euxine Sea. The Phasis does not spring from the mountains in Armenia, near the sources of the Euphrates, the Araxes, and the Tigris, as Strabo, Pliny, Ptolemy, Dionysius, and after them Arrian, Reland, Calmet, and Sanson, have falsely asserted; but rises in Mount Caucasus; and flows not from south to north, but from north to south, as appears from the map of Colchis or Mingrelia in Thevenot's collection, and the account which Sir John Chardin gives of that country. This river forms in its course a small island called also *Phasis*; whence the pheasants, if Isidorus is to be credited, were first brought to Europe, and thence called by the Greeks *Phasiani*. The other rivers of Colchis are considerable.

The whole kingdom of Colchis was in ancient times very pleasant and fruitful, as it is still where duly cultivated; abounded in all the necessities of life; and was enriched with many mines of gold, which gave occasion to the fable of the Golden Fleece and the Argonautic expedition so much celebrated by the ancients.

T

Sir

Mingrelia.

Sir John Chardin tells us, that this country extends above 100 miles in length and 60 in breadth; being not near so extensive as the ancient Colchis, which reached from the frontiers of Iberia or Georgia Proper, westward to the Palus Mæotis: that it is beautifully diversified with hills, mountains, valleys, woods, and plains, but badly cultivated: that there are all the kinds of fruits which are found in England, growing wild, but tasteless and insipid for want of culture: that, if the natives understood the art of making wines, those of this country would be the finest in the world: that there are many rivers which have their source in Mount Caucasus, particularly the Phasus, now called the *Rione*: that the country abounds in beeves, hogs, wild bears, stags, and other venison; and in partridges, pheasants, and quails: that falcons, eagles, pelicans, lions, leopards, tigers, wolves, and jackals, breed on Mount Caucasus, and sometimes greatly annoy the country: that the people are generally handsome, the men strong and well made, and the women very beautiful; but both sexes very vicious and debauched: that they marry their nieces, aunts, or other relations, indifferently; and take two or three wives if they please, and as many concubines as they will: that they not only make a common practice of selling their children, but even murder them, or bury them alive, when they find it difficult to bring them up: that the common people use a sort of paste, made of a plant called *gom*, instead of bread; but that of the better sort consists of wheat, barley, or rice: that the gentry have an absolute power over their vassals, which extends to life, liberty, and estate: that their arms are the bow and arrow, the lance, the sabre or broad-sword, and the buckler: that they are very nasty; and eat sitting cross-legged upon a carpet, like the Persians; but the poorer sort upon a mat or bench, in the same posture:

that the country is very thin of inhabitants, no less than 12,000 being supposed to be sold yearly to the Turks and Persians: that the principal commodities exported from it are, honey, wax, hides, castor, martin-skins, flax-seed, thread, silk, and linen-cloth; but that there are no gold or silver mines now, and very little money: that the revenue of the prince or viceroy amounts to about 20,000 crowns *per annum*: that the inhabitants call themselves *Christians*; but that both they and their priests are altogether illiterate, and ignorant of the doctrines and precepts of Christianity: that their bishops are rich, have a great number of vassals, and are clothed in scarlet and velvet: and that their service is according to the rites of the Greek church, with a mixture of Judaism and Paganism.

The cities of most note in this country in ancient times were Pityus; Dioscurias, or Dioscorias, which was so called from Castor and Pollux, two of the Argonauts, by whom it is supposed to have been founded, and who in Greek are styled *Dioscuroi*, at present known by the name of *Savatapoli*; Aea on the Phasis, supposed to be the same as Hupolis; *Phasis*, so called from the river on which it stood; Cyta, at the mouth of the river Cyaneus, the birth place of the famous Medea, called from thence, by the poets, *Cytais*; Saracæ, Zadriss, Surium, Madia, and Zoliffa. As for modern cities, it does not appear that there are any here considerable enough to merit a description; or, if there are, they seem to be little, if at all, known to Europeans.

MINHO, a great river in Spain, which taking its rise in Galicia, divides that province from Portugal, and falls into the Atlantic at Caminha.

MINIATURE, in a general sense, signifies representation in a small compass, or less than the reality.

Minho,
Miniature.

MINIATURE-PAINTING;

A DELICATE kind of painting, consisting of little points or dots; usually done on vellum, ivory, or paper, with very thin, simple water-colours.—The word comes from the Latin *minium*, “red-lead;” that being a colour much used in this kind of painting. The French frequently call it *mignature*, from *mignon*, “fine, pretty,” on account of its smallness and delicacy: and it may be ultimately derived from *μικρος* “small.”

Miniature is distinguished from other kinds of painting by the smallness and delicacy of its figures and faintness of the colouring; on which account it requires to be viewed very near.

SECT. I. Of Drawing and Designing.

To succeed in this art, a man should be perfectly skilled in the art of designing or drawing: but as most people who affect the one, know little or nothing of the other, and would have the pleasure of painting without giving themselves the trouble of learning to design (which is indeed an art that is not acquired without a great deal of time, and continual application), inventions have been found out to supply the

place of it; by means of which a man designs or draws, without knowing how to design.

The first is chalking: that is, if you have a mind to do a print or design in miniature, the backside of it, on another paper, must be blackened with small-coal, and then rubbed very hard with the finger wrapped in a linen cloth: afterwards the cloth must be lightly drawn over the side so blackened that no black grains may remain upon it to soil the vellum you would paint upon; and the print or draught must be fastened upon the vellum with four pins, to keep it from shifting. And if it be another paper that is blackened, it must be put between the vellum and the print, or draught, with the blackened side upon the vellum. Then, with a blunted pin or needle, you must pass over the principal lines or strokes of the print, or draught, the contours, the plaits of the drapery, and over every thing else that must be distinguished; pressing so hard, that the strokes may be fairly marked upon the vellum underneath.

Copying by squares is another convenient method for such as are but little skilled in the art of designing, and would copy pictures, or other things, that cannot be chalked. The method is this: The piece must be divided

Drawing
and
Designing.

divided into many equal parts by little squares, marked out with charcoal, if the piece be clear and whitish, and the black can be fairly seen upon it; or with white chalk, if it be too brown and dusky. After which, as many squares of equal dimensions must be made on white paper, upon which the piece must be designed; because, if this be done immediately upon vellum, (as one is apt to miscarry in the first attempt), the vellum may be soiled with false touches. But when it is neatly done upon paper, it must be chalked upon the vellum in the manner before described. When the original and the paper are thus ordered, observe what is in each square of the piece to be designed; as a head, an arm, a hand, and so forth; and place it in the corresponding part of the paper. And thus finding where to place all the parts of the piece, you have nothing to do but to form them well, and to join them together. By this method you may reduce or enlarge a piece to what compass you please, making the squares of your paper greater or less than those of the original; but they must always be of an equal number.

To copy a picture, or other thing, in the same size and proportion, another method is, to make use of varnished paper, or of the skin of a hog's bladder, very transparent, such as is to be had at the gold-beaters. Talc or isinglass will likewise do as well. Lay any one of those things upon your piece; through it you will see all the strokes and touches, which are to be drawn upon it with a crayon or pencil. Then take it off; and fastening it under paper or vellum, set up both against the light in the manner of a window; and with a crayon, or a silver needle, mark out upon the paper or vellum you have put uppermost, all the lines and touches you shall see drawn upon the varnished paper, bladder, talc, or isinglass, you have made use of, and which will plainly appear through this window.

After this manner, making use of the window, or of glass exposed to the light, you may copy all sorts of prints, designs, and other pieces, on paper or vellum; laying and fastening them under the paper or vellum upon which you would draw them. And it is a very good and a very easy contrivance for doing pieces of the same size and proportion.

If you have a mind to make pieces look another way, there is nothing to be done but to turn them; laying the printed or drawn side upon the glass, and fastening the paper or vellum upon the back of it; remembering to let your lights fall on the left side.

A good method likewise to take a true copy of a picture in oil, is to give a touch of the pencil upon all the principal strokes, with lake tempered with oil; and to clap upon the whole a paper of the same size: then passing the hand over it, the touches of the lake will stick and leave the design of your piece expressed upon the paper, which may be chalked like other things. But you must remember to take off with the crumb of bread what remains of the lake upon the picture before it be dry.

You must likewise make use of pounce, made of powdered charcoal put in a linen-rag; with which the piece you would copy must be rubbed, after you have pricked all the principal strokes or touches, and fastened white paper or vellum underneath.

But a surer and easier help than all these, for one who knows nothing of designing, is a mathematical

compass; it is generally made of ten pieces of wood, in form of rulers, half a quarter of an inch thick, half an inch broad, and a foot long, or more, according as you have a mind to draw pieces of a greater or less size. To facilitate the construction of this instrument, a figure is given, with an explanation of the manner in which it is to be used.

The little board A is to be of fir, and covered with linen or any other cloth; because the piece you copy, and the vellum or paper you copy upon, must be fixed upon it. Upon this board must the compass also be fixed with a pin, by the end of the first foot B, deep enough to keep it close, but not so deep as to hinder it from turning easily. When you have a mind to reduce things, place your original on the side of the foot C, and the vellum or paper you would draw upon on the side of the foot B; removing the vellum, or drawing it nearer, according as you intend to reduce or enlarge.

In order to enlarge a piece, you have nothing to do but to change the places of your original and your copy; placing the last towards C, and the other on the side of B.

And in both one and the other method, a crayon or leaden needle must be put in the foot under which the vellum lies; and a pin, a little blunted, in that over the original, with which all the traces are to be followed; conducting the pin with one hand, and with the other pressing gently upon the crayon or needle that marks the vellum. When the crayon or needle bears sufficiently upon the vellum, you have no occasion to touch it.

By this instrument you may also draw in equal dimensions: but in order to this, the compass must be fixed in another manner upon the board; for if it is to be fastened upon it by the middle at D, your original and your copy must be fixed on each side of this middle foot, at the equal distances, or from corner to corner; that is, from C to E, when the pieces are large. One may likewise draw several copies at once of equal and different dimensions.

When your piece is marked out upon the vellum, you must pass with a pencil of very clear carmine over all the traces, to the end they may not be effaced as you work: then clean your vellum with the crumb of bread, that no black may remain upon it.

Your vellum must be pasted upon a little plate of brass or wood, of the size you would make your piece, to keep it firm and tight: but this pasting must be on the edges of your vellum only, and behind the plate; for which purpose your vellum must exceed your plate above an inch on every side: for the part you paint upon must never be pasted; because it would not only give it an ill look, but you could not take it off if you would. Cut off the little shags and locks of the vellum; and wetting the fair side with a linen-cloth dipped in water, clap the other upon the plate with a clean paper between them: so much as hangs over must be pasted upon the back of the plate, drawing it equally on all sides, and hard enough to stretch it well.

SECT. II. Of Materials.

THE chief colours made use of for painting in miniature, are

Carmine.

Venice and Florence lake.

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Rose

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CCCXIV.

Rose pink.
Vermilion.
Red-lead.
Brown red.
Red orpiment.
Ultramarine.
Verditer.
Indigo.
Gall-stone.
Yellow-ochre.
Dutch pink.
Gamboge.
Naples yellow.
Pale masticot.
Deep yellow masticot.
Ivory-black.
Lamp-black.
True Indian ink.
Bistre, or wood-foot.
Raw umber.
Burnt umber.
Sap-green.
Verdigrise.
Flake-white.
Crayons of all colours.
Gold and silver shells.
Leaf-gold and leaf-silver.

The seven transparent colours, which are used where writing is seen through the colour.

Liquid	{ Lake.
	{ Blue.
	{ Yellow.
	{ Grass-green.
	{ Dark-green.
	{ Purple-colour.
	{ Brown.

Most of these colours necessary for miniature painting may easily be prepared by attending to the directions given under the article *COLOUR-Making*.

As colours taken from earth and other heavy matter are always too coarse be they never so well ground, especially for delicate work, because of a certain sand remaining in them; the finest parts may be drawn out by diluting them with the finger in a cup of water. When they are well steeped, let them settle a while: then pour out the clearest, which will be at top, into another vessel. This will be the finest, and must be let dry; and when it is used, must be diluted with gum-water.

If you mix a little of the gall of an ox, a carp, or an eel, particularly of the last, in green, black, grey, yellow, and brown, colours, it will not only take away their greasy nature, but also give them a lustre and brightness they have not of themselves. The gall of eels must be taken out when they are skinned, and hung upon a nail to dry; and when you would use it, it must be diluted with brandy; add a little of it mixed with the colour you have diluted already. This likewise makes the colour stick better to the vellum, which it hardly does when it is greasy: moreover, this gall hinders it from scaling.

Some colours are made clearer by fire; as yellow ochre, brown red, ultramarine, and umber: all others are darkened by it. But if you heat the said colours with a sharp fire, they change; for the brown-red be-

comes yellow; yellow ochre becomes red; umber red-dens also. Ceruss by fire takes the colour of citron, and is often called *masticot*. Observe, that yellow ochre heated, becomes more tender than it was, and softer than brown red. Likewise brown red heated becomes softer than fine yellow ochre. Both are very proper. The finest and truest ultramarine, heated upon a red-hot iron, becomes more glittering; but it wastes, and is coarser and harder to work with in miniature.

All these colours are diluted in little cups of ivory, made on purpose, or in sea-shells, with water in which gum arabic and sugar-candy are put. For instance, in a glass of water put a piece of gum as big as a walnut, and half that quantity of sugar-candy. This last hinders the colours from scaling when they are laid on, which they generally do when they want it, or the vellum is greasy.

This gum-water must be kept in a neat bottle corked; and you never must take any out of it with a pencil that has colour upon it, but with a quill or some such thing.

Some of this water is put in the shell with the colour you would temper, and diluted with the finger till it be very fine. If it be too hard, you must let it soften in the shell with the said water before you dilute it. Afterwards let it dry: and do thus with every colour, except lily-green, sap-green, and gamboge, which must be tempered with fair water only. But ultramarine, lake, and bistre, are to be more gummed than other colours.

If you make use of sea-shells, you must let them steep two or three days beforehand in water: then cleanse them in boiling-hot water, mixed with vinegar, in order to carry off a certain salt, which otherwise sticks to them, and spoils the colours that are put to them.

To know whether colours are sufficiently gummed, you have nothing to do but to give a stroke of the pencil upon your hand when they are diluted, which dries immediately: if they chap and scale, there is too much gum; if they rub out by passing the finger over them, there is too little. It may be seen likewise when the colours are laid on the vellum, by passing the finger over them. If they stick to it like a powder, it is a sign there is not gum enough, and more must be put to the water with which you temper them: but take care you do not put too much; for that makes the colour extremely hard and dry. It may be known likewise by their glueiness and brightness: so the more they are gummed, the darker they paint; and when you have a mind to give a greater strength to a colour than it has of itself, you have nothing to do but to give it a great deal of gum.

Provide yourself with an ivory pallet, very smooth, as big as your hand; on one side of which the colours for the carnation, or naked parts of a picture, are to be ranged in the following manner. In the middle put a great deal of white, pretty largely spread; because it is the colour most made use of: and upon the edge, from the left to the right, place the following colours at a little distance from the white.

Masticot.

Dutch-pink.

Orpiment.

Yellow

Colours,
&c.

Yellow ochre.

Green; composed of verditer, Dutch pink, and white, in equal quantities.

Blue; made of ultramarine, indigo, and white, to a great degree of paleness.

Vermilion.

Carmine.

Bistre, and

Black.

On the other side of the pallet, spread some white in the same manner as for the carnation. And when you have a mind to paint draperies, or other things, place near the white the colour you would make them of, in order to work, as shall be shown hereafter.

The use of good pencils is a great matter. In order to make a good choice, wet them a little; and if the hairs keep close together as you turn them upon the finger, and make but one point, they are good: but if they close not together, but make several points, and some are longer than others, they are good for nothing. When they are too sharp-pointed, with only four or five hairs longer than the rest, yet closing all together, they are, notwithstanding, good; but they must be blunted with a pair of scissars, taking care at the same time you do not clip away too much. It is proper to have two or three sorts of them; the largest for laying the grounds and dead colouring, and the smallest for finishing.

To bring the hairs of your pencil to join close together and make a good point, you must often put the pencil just between your lips when you are at work; moistening and pressing it close with the tongue, even when there is colour upon it; for if there be too much, some of it is taken off by this means, and enough left for giving fine and equal touches. You need not apprehend this will do you any harm. None of the colours for miniature, except orpiment, when they are prepared, have either ill taste or ill quality. This expedient must especially be used for dotting, and for finishing, particularly the naked parts of a picture, that the touches may be neat and fair, and not too much charged with colour. As for draperies and other things, as well in dead colouring as in finishing, it is sufficient, in order to make the hairs of your pencil join well, and to unload it when it has too much colour, to draw it upon the edge of the shell, or upon the paper you must put upon your work to rest your hand on, giving some strokes upon it before you work upon your piece.

To work well in miniature, you must do it in a room that has but one window, and fix yourself very near it, with a table and desk almost as high as the window; placing yourself in such a manner, that the light may always come in on the left side, and never forward or on the right.

When you would lay a colour on all parts equally strong, as for a ground, you must make your mixtures in shells, and put in enough for the thing you design to paint; for if there be not enough, it is a great chance but the colour you mix afterwards is too dark or too light.

SECT. III. *Of Working.*

AFTER having spoke of vellum, pencils, and colours,

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Working.

let us now show how they are to be employed. In the first place, then, when you would paint a piece, be it carnation, drapery, or any thing else, you must begin by dead-colouring; that is to say, by laying your colours on with liberal strokes of the pencil, in the smoothest manner you can, as the painters do in oil; not giving it all the force it is to have for a finishing; that is, make the lights a little brighter, and the shades less dark, than they ought to be; because in dotting upon them, as you must do after dead-colouring, the colour is always fortified, and would at last be too dark.

There are several ways of dotting; and every painter has his own. Some make their dots perfectly round; others make them a little longish; others hatch by little strokes that cross each other every way, till the work appears as if it had been wrought with dots. This last method is the best, the boldest, and the soonest done: wherefore such as would paint in miniature ought to use it, and to inure themselves from the first to dot in the plump and the soft way; that is to say, where the dots are lost, in a manner, in the ground upon which you work, and only so much appears as is sufficient to make the work seem dotted. The hard and the dry way is quite the reverse, and always to be avoided. This is done by dotting with a colour much darker than your ground, and when the pencil is not moistened enough with the colour, which makes the work seem rough and uneven.

Study likewise carefully to lose and drown your colours one in another, so that it may not appear where they disjoin; and to this end, soften or allay your touches with colours that partake of both, in such sort that it may not appear to be your touches which cut and disjoin them. By the word *cut*, we are to understand what manifestly separates and divides, and does not run in and blend itself with the neighbouring colours; which is rarely practised but upon the borders of drapery.

When your pieces are finished, to heighten them a little, give them a fine air; that is to say, give, upon the extremity of the lights, small touches with a colour yet lighter, which must be lost and drowned with the rest.

When the colours are dry upon your pallet or in your shells, in order to use them, they must be diluted with water. And when you perceive they want gum, which is seen when they easily rub off the hand or the vellum if you give a touch with them upon either, they must be tempered with gum-water instead of pure water, till they are in condition.

There are several sorts of grounds for pictures and portraitures. Some are wholly dark, composed of bistre, umbre, and Cologne earth, with a little black and white; others more yellow, in which is mixed a great deal of ochre; others greyer, which partake of indigo. In order to paint a ground, make a wash of the colour or mixture you would have it, or according to that of the picture or portraiture you would copy; that is to say, a very light lay, in which there is hardly any thing but water, in order to soak the vellum. Then pass another lay over that, somewhat thicker, and strike it on very smoothly with large strokes as quick as you can, not touching twice in the same place before it be dry; because the second stroke carries off what

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what has been laid on at the first, especially when you lean a little too hard upon the pencil.

Other dark grounds are likewise made of a colour a little greenish: and those are most in use, and the properest to lay under all sorts of figures and portraitures; because they make the carnation, or naked parts of a picture, appear very fine; are laid on very easily, and there is no occasion to dot them, as one is often obliged to do the others, which are rarely made smooth and even at the first; whereas in these one seldom fails of success at the first bout. To make them, you must mix black, Dutch pink, and white, all together; more or less of each colour, according as you would have them darker or lighter. You are to make one lay very light, and then a thicker, as of the first grounds. You may also make them of other colours, if you please; but these are the most common.

When you paint a holy person upon one of these grounds, and would paint a small glory round the head of your figure, you must not lay the colour too thick in that part, or you may even lay none at all, especially where this glory is to be very bright: but lay for the first time with white and a little ochre mixed together, of a sufficient thickness; and in proportion as you go from the place of the head, put a little more ochre; and to make it lose itself, and die away with the colour of the ground, hatch with a free stroke of the pencil, following the round of the glory, sometimes with the colour of which it is made, and sometimes with that of the ground, mixing a little white or ochre with the last when it paints too dark to work with: and do this till one be insensibly lost in another, and nothing can be seen to disjoin them.

To fill an entire ground with a glory, the brightest part is laid on with a little ochre and white, adding more of the first in proportion as you come nearer the edges of the picture: and when the ochre is not strong enough (for you must always paint darker and darker), add gall-stone, afterwards a little carmine, and lastly bistre. This first laying, or dead-colouring, is to be made as soft as possible; that is to say, let these shadowings lose themselves in one another without gap or interfection. Then the way is to dot upon them with the same colours, in order to drown the whole together; which is pretty tedious, and a little difficult, especially when there are clouds of glory on the ground. Their lights must be fortified in proportion as you remove from the figure, and finished as the rest, by dotting and rounding the clouds; the bright and obscure parts of which must run insensibly into one another.

For a day-sky, take ultramarine and a good deal of white, and mix them together. With this make a lay, as smooth as you can, with a large pencil and liberal strokes, as for grounds; applying it paler and paler as you descend towards the horizon; which must be done with vermilion or red lead, and with white of the same strength with that where the sky ends, or something less; making this blue lose itself in the red, which you bring down to the skirts of the earth, or tops of houses; mixing towards the end gall-stone and a good deal of white, in such a manner that the mixture be still paler than the former, without any visible interfection or parting between all these colours of the sky.

When there are clouds in the sky, you may spare the places where they are to be; that is to say, you need not lay on any blue there, but form them, if they are reddish, with vermilion, gall-stone, and white, with a little indigo; and if they are more upon the black, put in a good deal of the last; painting the lights of one and the other with masticot, vermilion, and white, more or less of any of these colours, according to the strength you would give them, or according to that of the original you copy; rounding the whole as you dot; for it is a difficult matter to lay them very smooth at the first painting: and if the sky is not even enough, you must dot it also.

It is at your pleasure to exempt the places of the clouds, for you may lay them upon the ground of the sky; heightening the bright parts by putting a good deal of white, and fortifying the shadows by using less. This is the shortest way.

A night or stormy sky is done with indigo, black, and white, mixed together; which is laid as for a day-sky. To this mixture must be added ochre, vermilion, or brown-red, for the clouds; the lights of which are to be of masticot, or red-lead, and a little white; now redder, now yellower, at discretion. And when it is a tempestuous sky, and lightning appears in some places, be it blue or red, it is to be done as in a day-sky, drowning and losing the whole together at the first forming or dead-colouring, and at the finishing.

SECT. IV. Of Draperies.

To paint a blue drapery, put ultramarine near the white upon your pallet; and mix a part of the one with the other, till it makes a fine pale, and has a body. With this mixture you must form the brightest parts; and then adding more ultramarine, form such as are darker; and go on after this manner till you come to the deepest plaits and the thickest shades, where you must lay pure ultramarine: and all this must be done as for a first-forming or dead-colouring; that is to say, laying the colour on with free strokes of the pencil, yet as smooth as you can; losing the lights in the shadows with a colour neither so pale as the light nor so dark as the shades. Then dot with the same colour as in the first-forming, but a small matter deeper; that the dots may be fairly seen. All the parts must be drowned one in another, and the plaits appear without interfection. When the ultramarine is not dark enough to make the deeper shadows, how well soever it be gummed, mix a little indigo with it to finish them. And when the extremities of the lights are not bright enough, heighten them with white and a very little ultramarine.

A drapery of carmine is done in the same manner as the blue; except that in the darkest places there is to be a lay of pure vermilion, before you dead-colour with carmine, which must be applied at top; and in the strongest shades, it must be gummed very much. To deepen it the more, mix a little bistre with it.

There is likewise made another red drapery, which is first drawn with vermilion, mixing white with it to dead-colour the bright places, laying it pure and unmixed for those that are darker, and adding carmine

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mine for the grand shades. It is finished afterwards, like other draperies, with the same colours. And when the carmine with the vermilion do not darken enough, work with the first alone, but only in the deepest of the shades.

A drapery of lake is made in the same manner with that of carmine; mixing a good deal of white with it for the bright places, and very little for those that are dark. It is finished likewise with dotting; but you have nothing to do with vermilion in it.

Violet-draperies are likewise done after this manner; after making a mixture of carmine and ultramarine, putting always white for the bright parts. If you would have your violet be columbine or dove-colour, there must be more carmine than ultramarine: but if you would have it bluer and deeper, put more ultramarine than carmine.

A drapery is made of a flesh-colour, beginning with a lay made of white, vermilion, and very pale lake; and making the shades with the same colours, using less white in them. This drapery must be very pale and tender, because the stuff of this colour is thin and light; and even the shades of it ought not to be deep.

To make a yellow drapery, put a lay of masticot over all; then one of gamboge upon that, excepting the brightest places, where the masticot must be left entire; the dead-colour with ochre, mixed with a little gamboge and masticot, putting more or less of the last according to the strength of the shades. And when these colours do not darken enough, add gall-stone. And gall-stone pure and unmixed is used for the thickest shades; mixing a little bistre with it, if there be occasion to make them still darker. You finish by dotting with the same colours you dead-coloured with, and losing the lights and the shades in one another.

If you put Naples-yellow, or Dutch-pink, in lieu of masticot and gamboge, you will make another sort of yellow.

The green drapery is made by a general lay of verditer; with which, if you find it too blue, mix masticot for the lights, and gamboge for the shades. Afterwards add to this mixture lily-green or sap-green, to shadow with; and as the shades are thicker, put more of these last greens, and even work with them pure and unmixed where they are to be extremely dark. You finish with the same colours, a little darker.

By putting more yellow, or more blue, in these colours, you may make different sorts of greens as you please.

To make a black drapery, you dead-colour with black and white, and finish with the same colour, putting more black as the shades are thicker; and for the darkest, mix indigo with it, especially when you would have the drapery appear like velvet. You may always give some touches with a brighter colour, to heighten the lights of any drapery whatsoever.

A white woollen drapery is made by a lay of white, in which there must be a very small matter of ochre, orpiment, or gall-stone, that it may look a little yellowish. Then dead-colour, and finish the shades with blue, a little black, white, and bistre; putting a great deal of the last in the darkest.

The light-grey is begun with black and white, and finished with the same colour deeper.

For a brown drapery, make a lay of bistre, white, and a little brown-red; and shadow with this mixture, made a little darker.

There are other draperies, called *variable*, because the lights are of a different colour from the shades. These are mostly used for the vestments of angels, for young and gay people, for scarfs and other airy attire, admitting of a great many folds, and flowing at the pleasure of the wind. The most common are the violets: of which they make two sorts; one, where the lights are blue; and the other, where they are yellow.

For the first, put a lay of ultramarine and very pale white upon the lights; and shadow with carmine, ultramarine, and white, as for a drapery wholly violet; so that only the grand lights appear blue. Yet they must be dotted with violet, in which there is a great deal of white, and lost insensibly in the shades.

The other is done by putting upon the lights only, instead of blue, a lay of masticot; working the rest as in the drapery all violet, excepting that it must be dotted, and the light parts blended with the shadowy, that is, the yellow with the violet, with a little gamboge.

The carmine-red is done like the last; that is, let the lights be done with masticot, and the shades with carmine; and to lose the one in the other, make use of gamboge.

The lake-red is done like that of carmine.

The green is done as the lake; always mixing verditer with lily or sap-green, to make the shades; which are not very dark.

Several other sorts of draperies may be made at discretion, always taking care to preserve the union of the colours, not only in one sort of cloth or so, but also in a group of several figures; avoiding, as much as the subject will allow, the putting of blue near the colour of fire, of green against black; and so of other colours which cut and disjoin, and whose union is not kind enough.

Several other draperies are made of foul colours, as brown-red, bistre, indigo, &c. and all in the same manner. Likewise of other colours, simple and compound; the agreement between which is always to be minded, that the mixture may produce nothing harsh and disagreeable to the eye. No certain rule can be laid down for this. The force and effect of your colours are only to be known from use and experience, and you must work according to that knowledge.

Linen-cloths are done thus: After drawing the plaits or folds, as is done in a drapery, put a lay of white over all; then dead-colour, and finish the shades with a mixture of ultramarine, black, and white, using more or less of the last, according to their strength or tenderness; and in the greatest deepening put bistre, mixed with a little white, giving only some touches of this mixture, and even of pure bistre, upon the extremities of the greatest shadows, where the folds must be drawn, and lost with the rest.

They may be done in another manner, by making a general lay of this mixture of ultramarine, black, and

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and very pale white; and dead-colour (as has been said before) with the same colour, but a little deeper. And when the shades are dotted and finished, heighten the lights with pure white, and lose them with the deepening of the linen. But of whatever sort you make them, when they are finished, you must give a yellowish tint of orpiment and white to certain places; laying it lightly on, and as it were in water; so that what is underneath may, notwithstanding, plainly appear, as well the shadows as the dotting.

Yellow linen-cloth is done by putting a lay of white, mixed with a little ochre. Then form and finish the shades with bistre, mixed with white and ochre; and in the thickest shades use pure bistre: and before you finish, give some tints here and there of ochre and white, and others of white and ultramarine, as well upon the shades as the lights; but let them be very bright: and drown the whole together in dotting, and it will look finely. As you finish, heighten the extremities of the lights with masticot and white. You may add to this sort of linen, as well as to the white, certain bars from space to space, as in Turkey-mantuas; that is, small stripes blue and red with ultramarine and carmine; one of red between two of blue, very bright and clear upon the lights, and deeper upon the shades. Virgins are pretty often dressed with veils of this sort (by Popish painters), and scarfs of this kind are put about necks that are bare; because they become the tint mighty well.

If you would have both these sorts of linen transparent, and the stuff or other thing that is beneath appear through them, make the first lay for them very light and clear, and mix in the colour to shadow with, a little of that which is underneath, especially towards the end of the shades; and only do the extremities of the lights, for the yellow, with masticot and white; and for the white, with pure white.

They may be done in another manner, especially when you would have them altogether as clear as muslin, lawn, or gauze. To this end form and finish what is to be beneath, as if nothing was to be put over it. Then mark out the light and clear folds with white or masticot; and a shadowy with bistre and white, or with black, blue, and white, according to the colour you would make them of; making the rest somewhat fainter: yet this is not necessary but for the parts that are not to be so clear.

Crape is done the same way; excepting that the folds of the shades and the lights, and the borders too, are to be marked out with little filaments of black upon what is underneath; which is likewise to be finished beforehand.

When you would make a stuff like a watered tabby, make the waves upon it with a colour a little lighter, or a little darker, in the lights and the shades.

There is a manner of touching draperies which distinguishes the filken from the woollen. The last are more terrestrial and sensible; the others more light and fading. But it must be observed, that this is an effect which depends partly upon the stuff and partly upon the colour; and for the employing these in a manner suitable to the subjects and the deepening of painting, we shall here touch upon their different qualities.

We have no colour which partakes more of light,
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nor which comes nearer the air, than white; which shows it to be fickle and fleeting. It may, nevertheless, be held and brought to by some neighbouring colour, more heavy and sensible, or by mixing them together.

Blue is a most fleeting colour: and so we see, that the sky and the remotest views of a picture are of this colour; but it will become lighter and fickler in proportion as it is mixed with white.

Pure black is the heaviest and most terrestrial of all colours; and the more of it you mix with others, the nearer you bring them to the eye.

Nevertheless, the different dispositions of black and white make also their effects different: for white often makes black disappear, and black brings white more into view; as in the reflection of globes, or other figures to be made round, where there are always parts that fly as it were from the eye, and deceive it by the craft of art: and under the white are here comprehended all the light colours; as under the black, all the heavy colours.

Ultramarine is, then, soft and light.

Ochre is not so much so.

Masticot is very light; and so is verditer.

Vermilion and carmine come near this quality.

Orpiment and gamboge not so near.

Lake holds a certain mean, rather soft than rough.

Dutch pink is an indifferent colour, easily taking the quality of others. So it is made terrestrial by mixing it with colours that are so; and, on the contrary, the most light and fleeting by joining it with white or blue.

Brown-red, umber, dark greens, and bistre, are the heaviest and most terrestrial, next to black.

Skilful painters, who understand perspective, and the harmony of colours, always observe to place the dark and sensible colours on the fore-parts of their pictures; and the most light and fleeting they use for the distances and remote views. And as for the union of colours, the different mixtures that may be made of them will learn you the friendship or antipathy they have to one another. And upon this you must take your measures for placing them with such agreement as shall please the eye.

For the doing of lace, French-points, or other things of that nature, put over all a lay of blue, black, and white, as for linen: then heighten the flower-work with pure white: afterwards make the shades above with the first colour, and finish them with the same. When they are upon the carnation or naked parts of a picture, or upon any thing else that you would show through another, finish what is beneath, as if nothing was to be put over it: and at top, make the points or lace with pure white, shadowing and finishing them with the other mixture.

If you would paint a fur, you must begin with a kind of drapery, done, if it be dark, with bistre and white, making the shadowings of the same colour, with less white. If the fur be white, do it with blue, white, and a little bistre. And when this beginning, or first-forming, is done, instead of dotting, draw small strokes, turning, now in one manner, now in another, according to the course and flattening of the hair. Heighten the lights of dark furs with ochre and white, and of the other with white and a little blue.

For

Of Carnations. For doing a building, if it be of stone, take indigo, bistre, and white, with which make the beginning or first form of it; and for shadowing it, put less of this last; and more bistre than indigo, according to the colour of the stone you would paint. To these you may likewise add a little ochre, both for the forming and the finishing. But to make it finer, you must give, here and there, especially for old fabrics, blue and yellow tints, some with ochre, others with ultramarine, mixing always white with them, whether before the first-forming, provided they appear through the draught, or whether upon it, losing or drowning them with the rest when you finish.

When the building is of wood, as there are many sorts, it is done at discretion; but the most ordinary way is to begin or first-form with ochre, bistre, and white, and finish without white, or with very little; and if the shades are deep, with pure bistre. In the other they add sometimes vermilion, sometimes green or black; in a word, just according to the colour they would give it; and they finish with dotting, as in draperies and every thing else.

SECT. V. *Of Carnations, or the naked parts of Painting.*

THERE are in carnation so many different colourings, that it would be a difficult thing to give general rules upon so variable a subject. Nor are they minded, when one has got, by custom and practice, some habit of working easily: and such as are arrived to this degree, employ themselves in copying their originals, or else they work upon their ideas, without knowing how: inasmuch, that the most skilful, who do it with less reflection and pains than others, would likewise be more put to it to give an account of their maxims and knowledge in the matter of painting, if they were to be asked what colours they made use of for such and such a colouring, a tint here, and another there.

Nevertheless, as beginners want some instruction at the first, we will show in general after what manner several carnations are to be done.

In the first place, after having drawn your figure with carmine, and ordered your piece, apply, for women and children, and generally for all tender colourings, a lay of white, mixed with a very little of the blue made for faces, of which we have told the composition; but let it hardly be seen.

And for men, instead of blue, they put in this first lay a little vermilion; and when they are old, a little ochre is mixed with it.

Afterwards follow all the traces with vermilion, carmine, and white, mixed together; and begin all the shades with this mixture, adding white in proportion as they are weaker; and putting but little in the darkest, and none, in a manner, in certain places where strong touches are to be given: for instance, in the corner of the eye; under the nose; at the ears; under the chin; in the separations of the fingers; in all joints; at the corners of the nails; and generally in every part where you would mark out separations in shades that are obscure. Neither need you fear to give to those places all the force and strength they ought to have as soon as you begin or first-form them,

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because in working at top with green, the red you have put there is always weakened.

After having begun, or first-formed, or dead-coloured, with red, make blue tints with ultramarine and a great deal of white, upon the parts which fly from the eye; that is to say, upon the temples; under and in the corners of the eyes; on both sides the mouth, above and below; a little upon the middle of the forehead; between the nose and the eyes; on the side of the cheeks; on the neck and other places where the flesh assumes a bluish cast. Yellowish tints are likewise made with ochre or orpiment, and a little vermilion mixed with white, under the eye-brows, on the sides of the nose towards the bottom, a little underneath the cheeks, and upon the other parts which rise and come nearer the eye. It is especially from these tints that the natural complexion is to be observed, in order to catch it; for painting being an imitation of nature, the perfection of the art consists in the justness and simplicity of the representation, especially in face-painting.

When, therefore, you have done your first lay, your dead colouring, and your tints, you must work upon the shades, dotting with green for the carnations or naked parts, mixing, according to the rule we have given for the tints, a little blue for the parts which fly from the eye; and, on the other hand, making it a little yellower for those that are more sensible; that is to say, which rise, and come nearer the eye: and at the end of the shades, on the side of the light, you must blend and lose your colour insensibly in the ground of the carnation with blue, and then with red, according to the places where you paint. If this mixture of green does not work dark enough at first, pass over the shades several times, now with red, and now with green; always dotting: and this do till they are as they should be.

And if you cannot with these colours give the shades all the force they ought to have, finish, in the darkest, with bistre mixed with orpiment, ochre, or vermilion, and sometimes with pure bistre, according to the colouring you would make, but lightly, laying on your colour very clear.

You must dot upon the clear and bright places with a little vermilion or carmine, mixed with much white, and a very small matter of ochre, in order to lose them with the shadowy, and to make the tints die away insensibly into one another; taking care, as you dot, or hatch, to make your strokes follow the turnings and windings of the fleshy parts. For though the rule be to cross always, this dotting or hatching ought to appear a little more here, because it rounds the parts. And as this mixture might make a colouring too red, if it was always to be used, they work likewise in every part, to blend the tints and the shades, with blue and a little green, and much white, so mixed as to be very pale; excepting, nevertheless, that this colour must not be put upon the cheeks, nor upon the extremities of the clear parts, no more than the other mixture upon these last, which must be left with all their light; as certain places of the chin, of the nose, and of the forehead, and upon the cheeks; which, and the cheeks, ought nevertheless to be redder than the rest, as well as the feet, the hollows of the hands, and the fingers of both.

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Observe,

Of
Carnations.

Observe, that these two last mixtures ought to be to pale, that the work shall hardly be visible; for they serve only to soften it; to unite the teints with one another, and the shades with the lights, and to drown the traces. Care must likewise be taken that you work not too much with the red mixture upon the blue teints, nor with the blue upon the others; but change the colour from time to time, when you perceive it works too blue or too red, till the work be finished.

The white of the eyes must be shadowed with this same blue, and a little flesh-colour; and the corners, on the side of the nose, with vermilion and white; giving them a little touch of carmine. The whole is softened with this mixture of vermilion, carmine, white, and a very small matter of ochre.

The apples or balls of the eyes are done with the mixture of ultramarine and white; the last prevailing a little; adding a little bistre, if they are yellowish; or a little black, if they are grey. Make the little black circle in the middle, called the *crystal of the eye*; and shadow the balls with indigo, bistre, or black, according to the colour they are of; giving to each a small touch of pure vermilion round the crystal; which must be lost with the rest at the finishing. This gives vivacity to the eye.

The round or circumference of the eye is done with bistre and carmine; that is to say, the slits or partings, and the eye-lids, when they are large and bold; especially the upper ones; which must afterwards be softened with the red or blue mixtures we have mentioned before, to the end they may be lost in one another, and nothing seem intersected. When this is done, give a little touch of pure white upon the crystal, on the side of the lights. This makes the eye shine, and gives life to it.

The mouth is dead-coloured with vermilion, mixed with white; and finished with carmine, which is softened as the rest. And when the carmine does not work dark enough, mix a little bistre with it. This is to be understood of the corners in the separation in the lips; and particularly, of certain mouths half open.

The hands, and all the other parts of carnation, are done in the same manner as the faces; observing, that the ends of the fingers be a little redder than the rest. When your whole work is formed and dotted, mark the separations of all the parts with little touches of carmine and orpiment mixed together, as well in the shadowy as the light places; but a little deeper and stronger in the first, and lose them in the rest of the carnation.

The eye-brows and the beard are dead-coloured, as are the shades of carnations; and finished with bistre, ochre, or black, according to the colour they are of, drawing them by little strokes the way they ought to go; that is to say, give them all the nature of hair. The lights of them must be heightened with ochre and bistre, a little vermilion, and much white.

For the hair of the head, make a lay of bistre, ochre, and white, and a little vermilion. When it is very dark-coloured, use black instead of ochre. Afterwards form the shadowy parts with the same colours, putting less white in them; and finish with pure bistre, or mixed with ochre or black, by small strokes very fine, and close to each other, waving and buckling them accord-

ing to the curling of the hair. The light parts must also be heightened by little strokes with ochre or orpiment, white, and a little vermilion. After which, lose the lights and the shades in each other, by working sometimes with a dark and sometimes with a light colour.

And for the hair about the forehead, through which the skin is seen, it must be first formed with the colour thereof, and that of the carnation, working and shadowing with one and the other, as if you designed to paint none. Then form it, and finish with bistre. The lights are to be heightened as the other. Grey hair is dead-coloured with white, black, and bistre, and finished with the same colour, but deeper; heightening the bright and clear parts of the hair, as well as those of the eye brows and the beard, with white and very pale blue, after having formed them as the others, with the colour of the flesh or skin; and finish with bistre.

But the most important thing is to soften one's work; to blend the teints in one another, as well as the beard and the hair about the forehead, with the other hair and the carnation; taking especial care not to work rough and dry; and that the traces, turnings, and windings of the carnation, or naked parts, be not intersected. You must likewise accustom yourself to put white in your colours only in proportion as you work lighter or darker: for the colour you use the second time must be always a little stronger and deeper than the first, unless it be for softening.

Different colourings are easily made, by putting more or less of red, or blue, or yellow, or bistre, whether for the dead-colouring, or for the finishing.—That for women ought to be bluish; that for children a little red; and both fresh and florid. That for men ought to be yellower; especially when they are old.

To make a colouring of death, there must be a first lay of white and orpiment, or a very pale ochre: dead-colour with vermilion, and lake, instead of carmine, and a good deal of white; and afterwards work over it with a green mixture, in which there is more blue than any other colour, to the end the flesh may be livid and of a purple colour. The teints are done the same way as in another colouring; but there must be a great many more blue than yellow ones, especially upon the parts which fly from the sight, and about the eyes; and the last are only to be upon the parts which rise and come nearer the eye. They are made to die away in one another, according to the ordinary manner; sometimes with very pale blue, and sometimes with ochre and white, and a little vermilion; softening the whole together. The parts and contours must be rounded with the same colours. The mouth is to be, in a manner, of a quite violet. It is dead-coloured, however, with a little vermilion, ochre, and white; but finished with lake and blue: and to give it the deep strokes, they take bistre and lake; with which they likewise do the same to the eyes, the nose, and the ears. If it is a crucifix, or some martyr, upon whom blood is to be seen, after the finishing the carnation, form it with vermilion, and finish it with carmine, making in the drops of blood a little bright reflecting spark, to round them. For the crown of thorns, make a lay of sea-green and masticot; shadow

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shadow it with bistre and green; and heighten the clear and light parts with masticot.

Iron is formed, or first laid, with indigo, a little black and white; and finished with pure indigo, heightening it with white.

For painting fire and flames, the lights are done with masticot and orpiment; and for the shades, they mix vermilion and carmine.

A smoke is done with black, indigo, and white, and sometimes with bistre; one may likewise add vermilion or ochre, according to the colour it is to be of.

Pearls are painted by putting a lay of white, and a little blue; they are shadowed and rounded with the same colour, deeper; a small white dot is made almost in the middle, on the side of the light; and on the other side, between the shadow and the edge of the pearl, they give a touch with masticot, to make the reflection; and under the pearls is made a little shadow of the colour of the ground they are upon.

Diamonds are made with pure black; then they heighten them with little touches of white on the side of the light. It is the same thing for any other jewels you have a mind to paint: there is nothing to be done but to change the colour.

For making a figure of gold, put a lay of shell-gold, and shadow it with gall-stone. Silver is done the same way; excepting that it must be shadowed with indigo.

One great means to acquire a perfection in the art, is to copy excellent originals. We enjoy with pleasure and tranquillity the labour and pains of others. But a man must copy a great number before he is able to produce as fine effects: and it is better to be a good copier than a bad author.

SECT. VI. *Of Landscapes.*

IN the first place, after having ordered the economy of your landscape as of your other pieces, you must form the nearest grounds or lands, when they are to appear dark, with sap or lily-green, bistre, and a little verditer, to give a body to your colour; then dot with this mixture, but a little darker, adding sometimes a little black to it.

For such pieces of ground as the light falls upon, and which are therefore clear and bright, make a lay of ochre and white: then shadow and finish with bistre. In some they mix a little green, particularly for shadowing and finishing.

There are sometimes upon the fore-part certain reddish lands; which are dead-coloured with brown-red, white, and a little green; and finished with the same, putting a little more green in them.

For the making of grafs and leaves upon the foreground, you must, when that is finished, form with sea-green, or verditer, and a little white; and for those that are yellowish, mix masticot. Afterwards shadow them with lily-green, or bistre and gall-stone, if you would have them appear withered.

The grounds or lands at a little distance are formed with verditer, and shadowed and finished with sap-green, adding bistre for some of the touches here and there.

Such as are at a greater distance, are done with

sea-green and a little blue; and shadowed with verditer.

In a word, the farther they go, the more bluish they are to be made; and the farthest distances ought to be of ultramarine and white; mixing in some places small touches of vermilion.

Water is painted with indigo and white, and shadowed with the same colour, but deeper; and to finish it, instead of dotting, they do nothing but make strokes and traces without crossing; giving them the same turn with the waves, when there are any. Sometimes a little green must be mixed in certain places, and the light and clear parts heightened with pure white, particularly where the water foams.

Rocks are dead-coloured like buildings of stone; excepting that a little green is mixed for forming and shadowing them. Blue and yellow tints are made upon them, and lost with the rest in finishing. And when there are small branches, with leaves, moss, or grafs, when all is finished, they are to be raised at top with green and masticot. They may be made yellow, green, and reddish, for appearing dry, in the same manner as on the ground. Rocks are dotted as the rest; and the farther they are off, the more greyish they are made.

Castles, old houses, and other buildings of stone and wood, are done in the manner abovementioned; speaking of those things, when they are upon the first lines. But when you would have them appear at a distance, you must mix brown-red and vermilion, with much white; and shadow very tenderly with this mixture; and the farther they are off, the weaker are the strokes to be for the separations. If they are covered with slate, it is to be made bluer than the rest.

Trees are not done till the sky be finished; one may, nevertheless, spare the places of them when they contain a good number; and however it be, such as come near the eye, are to be dead-coloured with verditer, mixing sometimes ochre; and shadowed with the same colours, adding lily-green. Afterwards you must work leaves upon them by dotting without crossing: for this must be done with small longish dots, of a darker colour, and pretty full of it, which must be conducted on the side the branches go, by little tufts of a little darker colour. Then heighten the lights with verditer or sea-green, and masticot, making leaves in the same manner: and when there are dry branches or leaves, they are dead-coloured with brown-red or gall-stone, with white; and finished with gall-stone, without white, or with bistre.

The trunks of trees are to be dead-coloured with ochre, white, and a little green, for the light and clear parts; and for the dark, they mix black, adding bistre and green for shadowing one and the other. Blue and yellow tints are likewise made upon them, and little touches given here and there with white and masticot; such as you ordinarily see upon the bark of trees.

The branches which appear among the leaves are done with ochre, verditer, and white; or with bistre and white, according to the light they are placed in. They must be shadowed with bistre and lily-green.

Trees, which are at a little distance, are dead-coloured with verditer and sea-green; and are shadowed

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and finished with the same colours, mixed with lily-green. When there are some which appear yellowish, lay with ochre and white, and finish with gall-stone.

For such as are in the distances and remote views, you must dead-colour with sea-green; with which, for finishing, you must mix ultramarine. Heighten the lights of one and the other with masticot, by small disjointed leaves.

It is the most difficult part of landscape, in manner of miniature, to leaf a tree well. To learn, and break one's hand to it a little, the way is to copy good ones; for the manner of touching them is singular, and cannot be acquired but by working upon trees themselves; about which you must observe to make little boughs, which must be leafed, especially such as are below and toward the sky.

And generally, let your landscapes be coloured in a handsome manner, and full of nature and truth; for it is that which gives them all their beauty.

SECT. VII. *Of Flowers.*

It is an agreeable thing to paint flowers, not only on account of the splendour of their different colours, but also by reason of the little time and pains that are bestowed in trimming them. There is nothing but delight in it; and, in a manner, no application. You maim and bungle a face, if you make one eye higher than another; a small nose with a large mouth; and so of other parts. But the fears of these disproportions constrain not the mind at all in flower-painting; for unless they be very remarkable, they spoil nothing. For this reason most persons of quality, who divert themselves with painting, keep to flowers. Nevertheless, you must apply yourself to copy justly: and for this part of miniature, as for the rest, we refer you to nature, for she is your best model. Work, then, after natural flowers; and look for the tints and different colours of them upon your pallet: a little use will make you find them easily; and to facilitate this to you at the first, we shall, in the continuance of our design, show the manner of painting some; for natural flowers are not always to be had; and one is often obliged to work after prints, where nothing is seen but graving.

It is a general rule, that flowers are designed and laid like other figures; but the manner of forming and finishing them is different: for they are first formed only by large strokes and traces, which you must turn at the first the way the small ones are to go, with which you finish; this turning aiding much thereto. And for finishing them, instead of hatching or dotting, you draw small strokes very fine, and very close to one another, without crossing; repassing several times, till your dark and your clear parts have all the force you would give them.

Of ROSES.—After making your first sketch, draw with carmine the red rose, and apply a very pale lay of carmine and white. Then form the shades with the same colour, putting less white in it: and lastly, with pure carmine, but very bright and clear at the first; fortifying it more and more as you proceed in your work, and according to the darkness of the shades. This is done by large strokes. Then finish; working

upon it with the same colour by little strokes, which you must make go the same way with those of the graving, if it be a print you copy; or the way the leaves of the rose turn, if you copy after a painting, or after nature; losing the dark in the clear parts, and heightening the greatest lights, and the brightest or most lightsome leaves, with white and a little carmine. You must always make the hearts of roses, and the side of the shadow darker than the rest; and mix a little indigo for shadowing the first leaves, particularly when the roses are blown, to make them seem faded. The seed is dead-coloured with gamboge; with which a little sap-green is mixed for shadowing. Roses streaked with several colours, ought to be paler than others, that the mixture of colours may be better seen; which are done with carmine; a little darker in the shades, and very clear in the lights; always hatching by strokes. For white roses you must put a lay of white, and form and finish them as the red; but with black, white, and a little bistre; and make the seed a little yellower. Yellow roses are done by putting in every part a lay of masticot, and shadowing them with gamboge, gall-stone, and bistre; heightening the clear and light places with masticot and white.

The stiles, the leaves, and the buds of all sorts of roses are formed with verditer, with which is mixed a little masticot and gamboge; and for shadowing them, they add sap-green, putting less of the other colours when the shades are deep. The outside of the leaves ought to be bluer than the inside: wherefore it must be dead-coloured with sea-green, and sap-green mixed with that for shadowing, making the veins or fibres on this side clearer than the ground, and those on the other side darker. The prickles which are upon the stiles and buds of roses, are done with little touches of carmine, which are made to go every way; and for those that are upon the stalks, they are formed with verditer and carmine, and shadowed with carmine and bistre: making the bottom of the stalks more reddish than the top: *i. e.* you must mix with the green, carmine and pure bistre.

Of TULIPS.—As there is an infinity of tulips, different from one another, one cannot pretend to mention the colours with which they are all done. We will only touch upon the handsomest, called *streaked*; and these streaks are dead-coloured with very clear carmine in some places, and with darker in others; finishing with the same colour by little strokes, which must be carried the same way with the streaks. And in others is put first a lay of vermilion. Then they form them by mixing carmine, and finish them with pure carmine. In some they put Florence-lake over the vermilion instead of carmine. Some are done with lake and carmine mixed together, and with lake alone, or with white and lake for the first forming; whether it be rose-pink or Florence-lake. There are some of a purple colour, which are formed with ultramarine, carmine, or lake, sometimes bluer and sometimes redder. The manner of doing both one and the other is the same: there is no difference but in the colours. You must, in certain places, as between the streaks of vermilion, carmine, or lake, sometimes put blue made of ultramarine and white, and sometimes a very bright purple, which is finished by strokes as the rest, and lost with the streaks. There are some likewise

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likewise that have fallow teints, that are made with lake, bistre, and ochre, according as they are: but this is only in fine and rare tulips, and not in the common ones. For shadowing the bottom of them, they ordinarily take indigo and white for such whose streaks are of carmine. For such as are of lake, they take black and white; with which, in some, bistre is mixed, and in others green. Some are likewise to be shadowed with gamboge and umber, and always by strokes and traces, that turn as the leaves turn. Other tulips are likewise done, called *bordered*; that is to say, the tulip is not streaked but on the edges of the leaves, where there is a border. It is white in the purple; red in the yellow; yellow in the red; and red in the white. The purple is laid with ultramarine, carmine, and white; shadowing and finishing it with this mixture. The border is spared; that is to say, let only a light lay of white be put there, and let it be shadowed with very bright indigo. The yellow is formed with gamboge, and shadowed with the same colour, mixing ochre and umber or bistre with it. The border is laid with vermilion, and finished with a very small matter of carmine. The red is formed with vermilion, and finished with the same colour, mixing carmine or lake with it. The bottom and the border are done with gamboge; and for finishing, they add gall-stone and umber, or bistre. The white is shadowed with black, blue, and white. Indian ink is very proper for this. The shadowings of it are very tender. It produces alone the effect of blue and white, mixed with the other black. The border of this white tulip is done with carmine. In all these sorts of tulips, they leave a nerve or sinew in the middle of the leaves that are brighter than the rest: and the borders are drowned at the bottom by small traces, turning crosswise; for they must not appear cut and separated, as the streaked or party-coloured. They make them likewise of several other colours. When they happen to be such whose bottoms on the inside are black, as it were, they form and finish them with indigo, as also the seed about the nozzle or stalk. And if the bottom is yellow, it is formed with gamboge, and finished by adding umbre or bistre. The leaves and the stalks of tulips are ordinarily formed with sea-green, and shadowed and finished with lily-green, by large traces all along the leaves. Some may likewise be done with verditer, mixing masticot with it, and shadowed with sap-green, that the green of the shades may be yellower.

The ANEMONY, or *Wind-flower*.—There are several sorts of them, as well double as single. The last are ordinarily without streaks. Some are made of a purple colour, with purple and white, shadowing them with the same colour; some redder, others bluer; sometimes very pale, and sometimes very dark. Others are formed with lake and white, and finished with the same, putting less white; some without any white at all. Others are formed with vermilion, and shadowed with the same colour, adding carmine. We see likewise white ones, and some of a citron colour. The last are laid with masticot; and one and the other shadowed and finished sometimes with vermilion, and sometimes with very brown lake, especially near the seed, at the bottom; which is often likewise of a blackish colour, that is done with indigo, or black and

blue, mixing for some a little bistre; and always working by very fine strokes and traces, and losing the lights in the shades. There are others that are brighter and clearer at the bottom than any where else; and sometimes they are perfectly white there, though the rest of the flower be dark. The seed of all these anemonies is done with indigo and black, with a very little white, and shadowed with indigo; and in some it is raised with masticot. The double anemonies are of several colours. The handsomest have their large leaves streaked. Some are done, that is, the streaked or party-coloured, with vermilion, to which carmine is added for the finishing; shadowing the rest of the leaves with indigo; and for the small leaves within, a lay is put of vermilion and white, and they are shadowed with vermilion mixed with carmine, mixing here and there some stronger touches, especially in the heart of the flower, next the great leaves on the side of the shadow. They finish with carmine, by little strokes and traces, turning the same way with the mixed or party-colours, and the leaves. They form and finish the streaks or party-colours of some others, as well as the small leaves, with pure carmine; leaving, nevertheless, in the middle of the last, a little circle, in which is laid dark purple, which is lost with the rest. And when all is finished, they give some touches with this same colour round about the small leaves, especially on the side of the shadow; drowning them with the large ones, the remainder of which is shadowed either with indigo or black. In some, the small leaves are done with lake or purple, though the party-colours of the large ones be done with carmine. There are others, whose mixed colours are done with carmine, in the middle of most of the large leaves; putting in some places vermilion underneath, and losing these colours with the shadows of the bottom; which are done with indigo and white. The small leaves are laid with masticot, and shadowed with very dark carmine on the side of the shade, and with very clear on the side of the light, leaving there in a manner pure masticot, and giving only some little touches with orpiment and carmine, to separate the leaves, which may be shadowed sometimes with a very little pale-green. There are double anemonies painted all red, and all purple. The first are formed with vermilion and carmine, in a manner without white, and shadowed with pure carmine, well gummed, that they may be very dark. Purple anemonies are laid with purple and white, and finished with white. In a word, there are double anemonies as there are single ones, of all colours; and they are done in the same manner. The green of one and the other is verditer; with which masticot is mixed for forming. It is shadowed and finished with sap-green. The stiles of them are a little reddish; wherefore they are shadowed with carmine mixed with bistre, and sometimes with green, after having laid them with masticot.

The CARNATION and the PINK.—It is with pinks and carnations as with anemonies and tulips; that is, there are some mixt-coloured, and others of one single colour. The first are streaked and diversified sometimes with vermilion and carmine; sometimes with pure lake, or with white; some streaks very dark, and others very pale; sometimes by little streaks and diversifications, and sometimes by large ones. Their bottoms

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bottoms are ordinarily shadowed with indigo and white. There are pinks of a very pale flesh-colour, and streaked and diversified with another, a little deeper, made with vermilion and lake. Others, which are of lake and white, are shadowed and streaked without white. Others all red, which are done with vermilion and carmine as dark as possible. Others all of lake. And, lastly, there are others, wherein nature or fancy is the rule. The green of one and the other is sea-green, shadowed with lily-green or sap-green.

The RED-LILY.—It is laid with red lead, formed with vermilion, and in the deepest of the shades with carmine; and finished with the same colour by strokes and traces, turning as the leaves turn. The clear and light parts are heightened with red-lead and white. The seed is done with vermilion and carmine. The green parts are done with verditer, shadowed with lily or sap-green.

The DAY-LILY.—There are three sorts of them:

1. The gridelin, a little red;
2. The gridelin, very pale; and,
3. The white.

For the first they put a lay of lake and white, and shadow and finish with the same colour deeper; mixing a little black to deaden it, especially in the darkest places.

The second are laid with white, mixed with a very little lake and vermilion, in such a manner that these two last colours are hardly seen. Afterwards they shadow with black and a little lake, working redder in the middle of the leaves, next the stalks; which ought to be, as also the seed, of the same colour, particularly towards the top; and at the bottom a little greener.

The stile of the seed is laid with masticot, and shadowed with sap-green.

The other day-lilies are done by putting a lay of pure white, and shadowing and finishing with black and white.

The stalks of these last, and the greens of them all, are done with sea-green, and shadowed with sap-green.

The HYACINTH, or *Purple-flower*.—There are four sorts of them:

- The blue, a little dark;
- Others paler;
- The gridelin;
- And the white.

The first are laid with ultramarine and white; and shadowed and finished with less white. Others are laid and shadowed with pale blue. The gridelines are formed with lake and white, and a very small matter of ultramarine; and finished with the same colour a little deeper. For the last they put a lay of white; then they shadow them with black, with a little white; and finish them all by strokes and traces, following the turnings and windings of the leaves. The green and the stalks of such as are blue, are done with sea and lily-green very dark: and in the stalks of the first may be mixed a little carmine, to make them reddish. The stalks of the two others, as also the green, are formed with verditer and masticot, and shadowed with sap-green.

The PIONY.—A lay of Venice-lake and white must

be put on all parts, pretty strong: then shadow with less white, and with none at all in the darkest places; after which finish with the same colour by traces, turning them as for the rose; gumming it very much in the deepest of the shades; and raising the lights and the edges of the most lightsome leaves with white and a little lake. Little veins are likewise made, which go like the strokes in hatching, but are more visible. The green of this flower is done with sea-green, and shadowed with sap-green.

COWSLIPS.—They are of four or five colours. There are some of a very pale purple

The gridelin. The white and the yellow.

The purple is done with ultramarine, carmine, and white; putting less white for shadowing. The gridelin is laid with Venice-lake, and a very small matter of ultramarine, with much white; and shadowed with the same colour deeper. For the white, a lay of white must be put; and they must be shadowed with black and white; and finished, as the others, by traces or strokes. The heart of these cowslips is done with masticot in the shape of a star, which is shadowed with gamboge, making a little circle in the middle with sap-green. The yellow are laid with masticot, and shadowed with gamboge and umber. The stiles, the leaves, and the buds, are formed with verditer, mixed with a little masticot, and finished with sap-green; making the fibres or veins, which appear upon the leaves, with this same colour; and heightening the lights of the largest with masticot.

The RANUNCULUS, or *Crow-foot*.—There are several sorts of them: the finest are the orange-coloured. For the first, they put a lay of vermilion, with a very small matter of gamboge; and add carmine for shadowing; finishing it with this last colour, and a little gall-stone. In the others may be put Venice-lake instead of carmine, especially in the heart of the flower. The orange-coloured are laid with gamboge, and finished with gall-stone, vermilion, and a little carmine; leaving some little yellow streaks. The green of the stalks is done with verditer and very pale masticot; mixing lily-green to shadow them. That of the leaves is a little darker.

The CROCUS.—These are of two colours:

Yellow and purple. The yellow are formed with masticot and gall-stone, and shadowed with gamboge and gall-stone: after which, upon each leaf, on the outside, are made three streaks, separate from one another, with bistre and pure lake; which are lost, by little traces, in the bottom. The outside of the leaves is left all yellow.—The purple is laid with carmine, mixed with a little ultramarine, and very pale white. They are formed and finished with less white; making likewise, in some, purple stripes or streaks, very dark, as in the yellow; and in others only small veins. The seed of both is yellow; and is done with orpiment and gall-stone. For the stiles, they put a lay of white, and shadow with black, mixed with a little green. The green of this flower is formed with very pale verditer, and shadowed with sap-green.

The IRIS.—The Persian iris is done by putting, for the inside-leaves, a lay of white, and shadowing them with indigo and green together, leaving a little white separation in the middle of each leaf; and for those

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those on the outside, they put in the same place a lay of masticot, which is shadowed with gall-stone and orpiment; making little dark and longish dots over all the leaf, at a small distance from one another. And at the end of each are made large strains, with bistre and lake in some, and in others with pure indigo, but very black. The rest, and the outside of the leaves, are shadowed with black. The green is formed with sea-green, and very pale masticot, and shadowed with sap-green. The Sufian iris is laid with purple and white, putting a little more carmine than ultramarine; and for the shades, especially in the middle leaves, they put less white; and, on the contrary, more ultramarine than carmine; making the veins of this very colour, and leaving in the middle of the inside leaves a little yellow finew. There are others which have this very finew in the first leaves; the end of which only is bluer than the rest. Others are shadowed and finished with the same purple, redder: They have also the middle finew on the outside leaves; but white and shadowed with indigo. There are likewise yellow ones; which are done by putting a lay of masticot and orpiment; shadowing them with gall-stone, and making the veins upon the leaves with bistre. The green of one and the other is done with sea-green, mixing a little masticot for the stiles. They are shadowed with sap-green.

The JASMIN.—It is done with a lay of white, and shadowed with black and white; and for the outside of the leaves, they mix a little bistre; making the half of each, on this side, a little reddish with carmine.

The TUBEROSE.—For the doing of this, they make a lay of white, and shadow with black, with a little bistre in some places; and for the outside of the leaves they mix a little carmine, to give them a reddish taint, particularly upon the extremities. The seed is done with masticot, and shadowed with sap-green. The green of it is laid with verditer, and shadowed with sap-green.

The HELLEBORE.—The flower of hellebore is done almost in the same manner; that is, let it be laid with white, and shadowed with black and bistre, making the outside of the leaves a little reddish here and there. The seed is laid with dark green, and raised with masticot. The green of it is foul and rusty, and is formed with verditer, masticot, and bistre; and finished with sap-green and bistre.

The WHITE LILY.—It is laid with white, and shadowed with black and white. The seed is done with orpiment and gall-stone. And the green is done as in the tuberoze.

The SNOW-DROP.—It is formed and finished as the white lily. The seed is laid with masticot, and shadowed with gall-stone. And the green is done with sea and sap-green.

The JONQUIL.—It is laid with masticot and gall-stone, and finished with gamboge and gall-stone. The green is formed with sea-green, and shadowed with sap-green.

The DAFFODIL.—All daffodils, the yellow, the double, and the single, are done by putting a lay of masticot: they are formed with gamboge, and finished by adding umber and bistre; excepting the bell in the middle, which is done with orpiment and gall-stone, bordered or edged with vermilion and carmine. The

white are laid with white, and shadowed with black and white; excepting the cup or bell, which is done with masticot and gamboge. The green is sea-green, shadowed with sap-green.

The MARIGOLD.—It is done by putting a lay of masticot, and then one of gamboge; shadowing it with this very colour, after vermilion is mixed with it: and for finishing, they add gall-stone and a little carmine. The green is done with verditer, shadowed with sap-green.

The AUSTRIAN ROSE.—For making the Austrian rose, they put a lay of masticot, and another of gamboge. Then they form it, mixing gall-stone; and finish it with the last colour, adding bistre and a very small matter of carmine in the deepest shades.

The INDIAN PINK, or *French Marigold*.—It is done by putting a lay of gamboge; shadowing it with this colour, after you have mixed a good deal of carmine and gall-stone with it; and leaving about the leaves a little yellow border of gamboge, very clear in the lights, and darker in the shades. The seed is shadowed with bistre. The green, as well of the rose as the pink, is formed with verditer, and finished with sap-green.

The SUN-FLOWER.—It is formed with masticot and gamboge, and finished with gall-stone and bistre. The green is laid with verditer and masticot, and shadowed with sap-green.

The PASSION-FLOWER.—It is done as the rose, and the green of the leaves likewise; but the veins are done with a darker green.

POETICAL PINKS and SWEET-WILLIAM.—They are done by putting a lay of lake and white; shadowing them with pure lake, with a little carmine for the last; which are afterwards dotted on all parts with little round dots, separate from one another; and the threads in the middle are raised with white. The green of them is sea-green, which is finished with sap-green.

The SCABIOUS.—There are two sorts of scabious, the red and the purple. The leaves of the first are laid with Florentine lake, in which there is a little white; and shadowed without white: and for the middle, which is a great boss or husk in which the seed lies, it is formed and finished with pure lake, with a little ultramarine or indigo to make it darker. Then they make little white longish dots over it, at a pretty distance from one another, clearer in the light than in the shade, making them go every way. The other is done by putting a lay of very pale purple, as well upon the leaves as the boss in the middle; shadowing both with the same colour, a little deeper: and instead of little white touches for the seed, they make them purple; and about each grain they make out a little circle, and this over the whole boss or husk in the middle. The green is formed with verditer and masticot, and shadowed with sap-green.

The SWORD or *Day-lily*.—It is laid with Florence lake and very pale white; formed and finished with pure lake, very clear and bright in some places, and very dark in others; mixing even bistre in the thickest of the shades. The green is verditer, shadowed with sap-green.

HEPATIC, or *Liverwort*.—There is red and blue. The last is done by putting on all parts a lay of ultramarine, white, and a little carmine or lake; shadow-

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Of
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ing the inside of the leaves with this mixture, but deeper; excepting those of the first rank; for which, and for the outside of every one of them, they add indigo and white, that the colour may be paler, and not so fine. The red is laid with lake-columbine and very pale white; and finished with less white. The green is done with verditer, masticot, and a little bistre; and shadowed with sap-green, and a little bistre, especially on the outside of the leaves.

The POMEGRANATE.—The flower of the pomegranate is laid with red lead; shadowed with vermilion and carmine; and finished with this last colour. The green is laid with verditer and masticot, and shadowed with sap-green.

The Flower of the Indian BEAN.—It is done with a lay of Levant-lake and white; shadowing the middle leaves with pure lake; and adding a little ultramarine for the others. The green is verditer, shadowed with sap-green.

The COLUMBINE.—There are columbines of several colours: the most common are the purple, the gridelin, and the red. For the purple, they lay with ultramarine, carmine, and white; and shadow with this mixture, deeper. The gridelin are done the same way, putting a great deal less ultramarine than carmine. The red are done with lake and white, finishing with less white. There are some mixed flowers of this kind, of several colours; which must be formed and finished as the others, but paler, making the mixtures of a little darker colour.

The LARK'S HEEL.—These are of different colours, and of mixed colours: the most common are the purple, the gridelin, and the red; which are done as the columbines.

VIOLETS and PANSIES.—Violets and pansies are done the same way; excepting that in the last the two middle leaves are bluer than the others, that is, the borders or edges; for the inside of them is yellow: and there little black veins are made, which take their beginning from the heart of the flower, and die away towards the middle.

The MUSCIPULA, or *Catch-fly*.—There are two sorts of it, the white and the red; the last is laid with lake and white, with a little vermilion, and finished with pure lake. As for the knot or nozzle of the leaves, it is formed with white and a very small matter of vermilion, mixing bistre or gall-stone to finish it. The leaves of the white are laid with white; adding bistre and masticot upon the knots, which are shadowed with pure bistre, and the leaves with black and white. The green of all these flowers is done with verditer and masticot, and shadowed with sap-green.

The CROWN IMPERIAL.—There are of two colours, the yellow and the red. The first is done by putting a lay of orpiment, and shadowing it with gall-stone and orpiment, with a little vermilion. The other is laid with orpiment and vermilion, and shadowed with gall-stone and vermilion; making the beginning of the leaves next the stile, with lake and bistre, very dark; and veins with this mixture, both in one and the other, all along the leaves. The green is done with verditer and masticot, shadowed with sap-green and gamboge.

The CYCLAMEN, or *Sowbread*.—The red is laid with carmine, a little ultramarine, and much white;

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and finished with the same colour, deeper; putting, in a manner, only carmine in the middle of the leaves, next the heart, and in the rest add a little more ultramarine. The other is laid with white, and shadowed with black. The stalks of one and the other ought to be a little reddish; and the green, verditer and sap-green.

The GILLIFLOWER.—There are several sorts of gilliflowers; the white, the yellow, the purple, the red, and the mixed, of various colours. The white are laid with white, and shadowed with black, and with a little indigo in the heart of the leaves. The yellow, with masticot, gamboge, and gall-stone. The purple are formed with purple and white; and finished with less white; making the colour brighter in the heart, and even a little yellowish. The red with lake and white; finishing them with white. The mixed-coloured are laid with white, and the mixtures are sometimes made with purple, in which there is much ultramarine; others again, in which there is more carmine. Sometimes they are of lake, and sometimes of carmine. Some are done with white, and others without white; shadowing the rest of the leaves with indigo. The seed of all is formed with verditer and masticot, and finished with sap-green. The leaves and stiles are laid with the same green, mixing sap-green to finish them.

FRUITS, fishes, serpents, and all sorts of reptiles, are to be touched in the same manner as the figures of men are; that is, hatched or dotted.

Birds and all other animals are done like flowers, by strokes or traces.

Never make use, for any of these things, of white-lead. It is only proper in oil. It blackens like ink, when only tempered with gum; especially if you set your work in a moist place, or where perfumes are. Cerufs of Venice is as fine, and of as pure a white. Be not sparing in the use of this, especially in forming or dead colouring; and let it enter into all your mixtures, in order to give them a certain body, which will render your work gluish, and make it appear soft, plump, and strong.

The taste of painters is, nevertheless, different in this point. Some use a little of it, and others none at all. But the manner of the last is meagre and dry. Others use a great deal; and doubtless it is the best method, and most followed among skilful persons: for besides that it is speedy, one may by the use of it copy all sorts of pictures; which would be almost impossible otherwise; notwithstanding the contrary opinion of some, who say, that in miniature we cannot give the force and all the different taints we see in pieces in oil. But this is not true, at least of good painters; and effects prove it pretty plainly: for we see figures, landscapes, pictures, and every thing else in miniature, touched in as grand, as true, and as noble a manner (though more tender and delicate), as they are in oil.

However, painting in oil has its advantages; were they only these, that it exhibits more work, and takes up less time. It is better defended likewise against the injuries of time; and the right of birth must be granted it, and the glory of antiquity.

But miniature likewise has its advantages; and without repeating such as have been mentioned already, it is neater and more commodious. You may easily carry all

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all your implements in your pockets, and work when and wherever you please, without such a number of preparations. You may quit and resume it when and as often as you will; which is not done in the other; in which one is rarely to work dry.

To conclude: In the art of painting, excellence does not depend upon the greatness of the subject, but upon the manner in which it is handled. Some catch

the airs of a face well; others succeed better in landscapes: some work in little who cannot do it in large: some are skilled in colours who know little of design: others, lastly, have only a genius for flowers: and even the Bassans got themselves a fame for animals; which they touched in a very fine manner, and better than any thing else.

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MINIM, in music, a note equal to two crotchets, or half a semibreve. See **MUSIC**.

MINIMS, a religious order in the church of Rome, founded by St Francis de Paula, towards the end of the 15th century. Their habit is a coarse black woollen stuff, with a woollen girdle, of the same colours, tied in five knots. They are not permitted to quit their habit and girdle night nor day. Formerly they went bare-footed, but are now allowed the use of shoes.

MINIMUM, in the higher geometry, the least quantity attainable in a given case.

MINISTER, a person who preaches, performs religious worship in public, administers the sacraments, &c.

MINISTER of State, a person to whom the prince intrusts the administration of government. See **COUNCIL**.

Foreign MINISTER, is a person sent into a foreign country, to manage the affairs of his province or of the state to which he belongs. Of these there are two kinds: those of the first rank are ambassadors and envoys extraordinary, who represent the persons of their sovereigns; the ministers of the second rank are the ordinary residents.

MINIUM, or **RED-LEAD**, is a calx of lead of a vivid red colour, which colour it acquires by a slow calcination and reverberation. See **CHEMISTRY**, n° 1213. The minium in commerce is chiefly brought from Holland, where large quantities of it are manufactured.

The method in which minium is made in large quantities with us is this—They first burn lead in a furnace into a kind of litharge, by continually stirring it while melted with an iron rake; this they afterwards grind with two pair of stones, which deliver it from one to another, the first pair grinding it coarser, the second finer; these are worked by means of a mill which moves six pair of them at once. When thus reduced to a fine powder, it is washed and then put into a furnace, and is burnt with a reverberatory fire for two or three days, all the while they continue stirring it with a large iron rake, hung on a swivel or iron hook; and toward the end of the time they watch its being of the right colour. When this is doing, the fire must not be carried beyond a certain degree, lest the matter clod and run together.

• Mem. de
l'Acad.
RoyaL, 1770.

The process by which minium is prepared is described in the following manner by M. Jars*. The furnace is of the reverberatory kind, with two fire-places at the ends; each fire-place being separated from the area, or body of the furnace, by a wall twelve inches high. The fire-places are fifteen inches

broad, and their length is equal to the breadth of the whole furnace, which is about eight or nine feet. The length of the area from one place to the other is nine or ten feet. The quantity of lead used in one operation is about 1500 pounds, of which nine parts are lead obtained from furnaces where the ore is smelted, and one part is lead extracted from the scoria which is formed in smelting the ore. This latter kind is said to be necessary, as the former could not alone be reduced into powder. All the lead is at once put into the area, the bottom of which is level. The calx, as fast as it is formed, is drawn to one side, by means of a rake suspended by a chain before the mouth of the furnace. In four or five hours the whole quantity of the lead is calcined, or, if any pieces remain uncalcined, they are separated, and kept for the next operation. The heat employed is that of a cherry-red, and the fire-places and mouth are kept open, that the air may accelerate the calcination. The powder or calx is to be frequently stirred to prevent its concreting; and when this operation has been continued about 24 hours, the matter is taken out of the furnace, and laid on a flat pavement. Then cold water is thrown on it, to give it weight, as the workmen say; but rather (as M. Jars thinks) to make it friable. It is then to be ground in a mill, and the finer part is separated by washing, while the coarser part, reserved for some following operation, is to be placed at the mouth of the furnace in order to retain the melted lead. The fine powder, which is now of a yellow colour, is again put into the same or a similar furnace, and exposed to a very moderate fire, from 36 to 48 hours; during which time, it is stirred frequently to prevent its concreting; and the powder gradually acquires its proper red colour. The minium is then to be taken out of the furnace, cooled, and sifted through an iron sieve placed in a cask.

The bright colour of minium might render it valuable in painting, if it could stand with certainty in either oil or water. But as it is subject to become black, it cannot be safely trusted, except in hard varnishes: and is, therefore, seldom used in oil, or even in water, unless for very gross purposes, or as a ground for vermilion. The goodness of minium may be distinguished by the brightness of its colour: and the adulteration to which it is liable may be detected by putting an ounce of it into a crucible with an equal quantity of charcoal dust, well mixed together, and placing the crucible in a common fire sufficient to melt lead, which is to be covered with another small crucible inverted into it. When it has been continued for some time on the fire, take it out and strike it

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Minorca.

against the ground. The minium will thus be reduced to its metallic state; and its diminished weight, when freed from the charcoal dust and cold, will indicate the proportion of adulterated matter. Minium is also used as a flux in forming the enamel for grounds, and in glazing, &c.

In medicine, minium is used as an external application. It obtunds the acrimony of the humours, allays inflammations, and is excellent in the cleansing and healing of old ulcers: It is used on these occasions in many of the plasters and ointments of the shops. It was an ingredient in the officinal composition called *emplastrum deminio*, employed as a desiccative and cicatrizer; but now disused for that made in the same manner with litharge, because it does not stick so well, and is more difficult of preparation.

MINNIN, a stringed instrument of music among the ancient Hebrews, having three or four chords to it. See Plate CCCXIV. Though there is reason to question the antiquity of this instrument; both because it requires a hair-bow, which was a kind of plectrum not known to the ancients, and because it so much resembles the modern viol. Kircher took the figures of this, the machul, chinnor, and psaltery, from an old book in the Vatican library.

MINOR, a Latin term, literally denoting *less*; used in opposition to *major*, greater.

MINOR, in law, denotes a person under age; or who, by the laws of the country, is not yet arrived at the power of administering his own affairs, or the possession of his estate. Among us, a person is a minor till the age of twenty-one: before which time his acts are invalid. See AGE, and INFANT.

It is a maxim in the common law, that in the King there is no minority, and therefore he hath no legal guardian; and his royal grants and assents to acts of parliament are good, though he has not in his natural capacity attained the legal age of twenty-one. It is also provided by the custom and law of parliament, that no one shall sit or vote in either house, unless he be twenty-one years of age. This is likewise expressly declared by stat. 7 and 8 Will. III. cap. 25. with regard to the house of commons.

MINOR, in logic, is the second proposition of a formal or regular syllogism, called also the *assumption*.

MINOR, in music, is applied to certain concords, which differ from or are lower than others of the same denomination by a lesser semitone or four commas. Thus we say, a third minor, or lesser third, or a sixth major and minor. Concords that admit of major and minor, i. e. greater and less, are said to be imperfect concords.

MINORCA, an island of the Mediterranean, situated between 39 and 40 degrees of North Latitude, and near four degrees of East Longitude. It is about 33 miles in length from north-west to south-east, in breadth from eight to twelve, but in general about ten miles; so that in size it may nearly equal the county of Huntingdon or Bedfordshire. The form is very irregular; and the coasts are much indented by the sea, which forms a great number of little creeks and inlets, some of which might be very advantageous.

This island is one of those called by the ancient Romans *Baleares*, which arose from the dexterity of the inhabitants in using the sling. It fell under the power

of the Romans, afterwards of the northern barbarians, who destroyed that empire. From them it was taken by the Arabs, who were subdued by the king of Majorca, and he by the king of Spain. The English subdued it in 1708, and the French in the late war; but it was restored to Britain by the treaty of Paris in 1763.

The air of this island is much more clear and pure than in Britain; being seldom darkened with thick fogs: yet the low valleys are not free from mists and unwholesome vapours; and in windy weather the spray of the sea is driven over the whole island. Hence it happens that utensils of brass or iron are extremely susceptible of rust, in spite of all endeavours to preserve them; and household-furniture becomes mouldy. The summers are dry, clear, calm, and excessively hot; the autumns moist, warm, and unequal; at one time perfectly serene, at another cloudy and tempestuous. During the winter there are sometimes violent storms, though neither frequent nor of long continuance; and whenever they cease, the weather returns to its usual serenity. The spring is always variable, but resembles the winter more than the summer. The changes of heat and cold are neither so great nor so sudden in this climate as in many others. In the compass of a year, the thermometer seldom rises much above the 80th, or falls below the 48th degree. In summer there is scarcely ever a difference of four or five degrees between the heat of the air at noon and at night; and in winter the variation is still less considerable. But this must be understood of a thermometer shaded from the influence of the solar beams: for if exposed to them it will often rise 12, 14, or 16 degrees higher than what we have mentioned; and in other seasons the difference between the heat of the air in the sun and the shade is much greater. Yet, even in the dog-days, the heat of the atmosphere, at least in open places, seldom surpasses that of human blood. The winds are very boisterous about the equinoxes, and sometimes during the winter. At other times they are generally moderate; and, according to the observations of seamen, they rarely blow in the same direction near the islands adjacent to the gulph of Lyons as in the open sea. During the summer there is commonly a perfect calm in the mornings and evenings: but the middle of the day is cooled by refreshing breezes which come from the east, and, following the course of the sun, increase gradually till two or three in the afternoon; after which they insensibly die away as night approaches. This renders the heat of the sun less dangerous and inconvenient; and if these breezes intermit for a day or two, the natives grow languid and inactive from the heat. The northerly winds in general are clear and healthy, dispel the mists, and make a clear blue sky; whilst those which blow from the opposite quarter, render the air warm, moist, and unhealthy. The north wind is superior in power to all the rest; which appears from hence, that the tops of all the trees incline to the south, and the branches on the north side are bare and blasted. The next to it in force is the north-west. Both are frequent towards the close of winter and in the spring; and, being dry and cold, they shrivel up the leaves of the vegetables, destroy their tender shoots, and are often excessively detrimental to the vineyards and *ring*.

Minorca

Minorca. *sing corn.* The piercing blasts at that season from the north-east, as they are more moist, and more frequently attended with rain, are less prejudicial. The south and south-east winds are by much the most unhealthy. In whatever seasons they blow, the air is foggy, and affects the breathing; but in the summer season they are sultry and suffocating. An excessive dejection of spirits is then a universal complaint; and on exposing the thermometer to the rays of the sun, the mercury has frequently risen above the 100th degree. The west wind is usually drier than the south: the east is cold and blustering in the spring, and sultry in the summer.

The weather in Minorca is generally fair and dry; but when it rains, the showers are heavy, though of short continuance, and they fall most commonly in the night. The sky in summer is clear, and of a beautiful azure, without clouds or rain; but moderate dews descend regularly after sunset. In autumn the weather becomes less serene; whirlwinds and thunder become frequent; and in the night-time lightning, and those meteors called *falling stars*, are very common. Water-spouts also are often seen at that season, and frequently break upon the shore. A sudden alteration in the weather takes place about the autumnal equinox; the skies are darkened with clouds, and the rains fall in such quantities, that the torrents thereby occasioned, pouring down from the hills, tear up trees by the root, carry away cattle, break down fences, and do considerable mischief to the gardens and vineyards. But these anniversary rains are much more violent than lasting; always falling in sudden and heavy showers, with intervals of fair weather. They are accompanied with thunder, lightning, and squalls of wind, most commonly from the north. Hail and snow are often intermixed with the rains which fall in winter and in spring; but the snow, for the most part, dissolves immediately; and ice is here an uncommon appearance.

The whole coast of Minorca lies low; and there are only a few hills near the centre, of which the most considerable, named *Toro* by the inhabitants, may be seen at the distance of 12 or 14 leagues from the land. The surface of the island is rough and unequal; and in many places divided by long narrow vales of a considerable depth, called *barancoes* by the natives. They begin towards the middle of the island, and after several windings terminate at the sea. The south-west side is more plain and regular than towards the north-east; where the hills are higher, with low marshy valleys betwixt them, the soil less fruitful, and the whole tract unhealthy to man and beast. Near the towns and villages the fields are well cultivated, and inclosed with stone-walls; but the rest for the most part are rocky, or covered with woods and thickets. There are some pools of standing water, but very few rivulets, which is the greatest defect about the island, as the inhabitants have scarcely any wholesome water excepting what is saved from the clouds.

The soil is light, thin, and very stony, with a good deal of sea-salt, and, in some places, of calcareous nitre intermixed. In most places there is so little earth, that the island appears to be but one large irregular rock covered here and there with mould, and an infinite variety of stones. Notwithstanding this, how-

ever, it is not only extremely proper for vineyards, but produces more wheat and barley than could at first sight be imagined; and, if the peasants may be credited, it would always yield a quantity of corn and wine sufficient for the natives, did not the violence of the winds, and the excessive drought of the weather, frequently spoil their crops. The fields commonly lie fallow for two years, and are sown the third. About the latter end of winter, or the beginning of spring, they are first broke up: and next autumn, as soon as the rains fall, they are again ploughed and prepared for receiving the proper seeds. The tillage is very easily performed; for a plough so light as to be transported from place to place on the ploughman's shoulder, and to be drawn by an heifer, or an ass sometimes assisted by an hog, is sufficient for opening so thin a soil. The later the harvest happens, the more plentiful it proves. The barley is usually cut down about the 20th of May N. S. and the wheat is reaped in June, so that the whole harvest is commonly got in by midsummer-day. The grain is not threshed with flails as in this country, but trodden out on a smooth piece of rock by oxen and asses, according to the custom of the eastern nations.

The natives of Minorca are commonly lean, thin, and well-built, of a middle stature, and olive complexion; but their character is by no means agreeable. Such is the natural impetuosity of their temper, that the slightest cause provokes them to anger, and they seem to be incapable of forgiving or forgetting an injury. Hence quarrels break out daily, even among neighbours and relations; and family disputes are transmitted from father to son; and thus, though lawyers and pettifoggers are very numerous in this country, there are still too few for the clients. Both sexes are, by constitution, extremely amorous: they are often betrothed to each other while children, and marry at the age of 14. The women have easy labours, and commonly return in a few days to their usual domestic business; but, lest the family should become too numerous for their income, it is a practice among the poorer sort to keep their children at the breast for two or three years, that by this means the mothers may be hindered from breeding.

Bread of the finest wheat flour, well fermented and well baked, is more than half the diet of people of all ranks. Rice, pulse, vermicelli, herbs and roots from the garden, summer-fruits, pickled olives, and pods of the Guinea pepper, make up almost all the other half, so that scarce a fifth of their whole food is furnished from the animal kingdom, and of this fish makes by much the most considerable portion. On Fridays, and other fast days, they abstain entirely from flesh; and during Lent they live altogether on vegetables and fish, excepting Sundays, when they are permitted the use of eggs, cheese, and milk. Most of their dishes are high-seasoned with pepper, cloves, cinnamon, and other spices; and garlic, onions, or leeks, are almost constant ingredients. They eat a great deal of oil, and that none of the sweetest or best flavoured; using it not only with sallads, but also with boiled and fried fish, greens, pulse, &c. instead of butter. A slice of bread soaked in boiled water, with a little oil and salt, is the common breakfast of the peasants, well known by the name of *oleagua*. Their ordinary meals are

Minorca. very frugal, and consist of very little variety; but on festivals and other solemn occasions their entertainments are to the last degree profuse and extravagant, inso-much that the bill of fare of a country farmer's wedding-dinner would scarce be credited.

With regard to other matters, the Minorquins are accused of prodigious indolence in the way of business, and neglect of the natural advantages they possess. In the bowels of the earth are iron, copper, and lead-ores, of none of which any use hath been made except the last. A lead-mine was worked to advantage some time ago, and the ore sent into France and Spain for the use of the potteries in those countries. The proprietor discontinued his work on some small discouragement; and indeed it is said, that these people are of all mankind the most easily put out of conceit with an undertaking that does not bring them in mountains of present gain, or that admits of the slightest probability of disappointing their most sanguine expectations: nor will their purse admit of many disappointments; and thus their poverty co-operating with their natural despondence and love of ease, is the principal cause of their backwardness to engage in projects, though ever so promising, for the improvement of their private fortune, and the advantage of the commerce of their country. This lead-ore went under the name of *vernis* among the natives, as it was wholly used by the potters in varnishing and glazing their earthen vessels.

There are few exports of any account, and they are obliged to their neighbours for near one-third of their corn, all their oil, and such a variety of articles of less consideration, that nothing could preserve them from a total bankruptcy, but the English money circulated by the troops, which is exchanged for the daily supplies of provisions, increased by the multiplication of vineyards, the breeding of poultry, and the production of vegetables, in a proportion of at least five to one since the island has been in our possession. It will not require many words to enumerate their exports: they make a sort of cheese, little liked by the English, which sells in Italy at a very great price; this, perhaps, to the amount of 800 l. *per annum*.—The wool they send abroad may produce 900 l. more. Some wine is exported; and, if we add to its value that of the home-consumption, which has every merit of an export, being nine parts in ten taken off by the troops for ready money, it may well be estimated at 1600 l. a-year. In honey, wax, and salt, their yearly exports may be about 400 l. and this comes pretty near the sum of their exports, which we estimate together at 18,000 l. *Sterling per annum*.

A vast balance lies against them, if we consider the variety and importance of the articles they fetch from other countries, for which they must pay ready cash. Here it may be necessary to withdraw some things from the heap, such as their cattle, sheep, and fowls, on which they get a profit; for the country does not produce them in a sufficient abundance to supply them, especially when we have a fleet of men of war stationed there.

Their imports are, corn, cattle, sheep, fowls, tobacco, oil, rice, sugar, spices, hard-ware, and tools of all kinds; gold and silver lace; chocolate, or cocoa to make it; tobacco, timber, plank, boards, mill-stones, tobacco-pipes, playing cards, turnery ware,

seeds, soap, saddles; all manner of cabinet-makers work, iron spikes, nails, fine earthen-ware, glass-lamps, brassery, paper, and other stationary wares; copperas, galls, dye-stuffs, painters brushes, and colours; musical instruments, music, and strings; watches, wine, fruit, all manner of fine and printed linens, muslins, cambrics, and laces; bottles, corks, starch, indigo, fans, trinkets, toys, ribbands, tape, needles, pins, silk, mohair, lanthorns, cordage, tar, pitch, rosin, drugs, gloves, fire-arms, gunpowder, shot, and lead; hats, caps, velvet, cotton stuffs, woollen cloths, stockings, capes, medals, vestments, lustres, pictures, images, agnus Dei's, books, pardons, bulls, relics, and indulgencies.

The island is divided into what they style *terminos*, of which there were anciently five, now reduced to four, and resemble our counties. The termino of Ciudadella, at the north-western extremity of the island, is so styled from this place, which was once a city, and the capital of Minorca. It makes a venerable and majestic figure, even in its present state of decay, having in it a large Gothic cathedral, some other churches and convents, the governor's palace, and an exchange, which is no contemptible pile.—There are in it 600 houses, which, before the seat of government and the courts of justice were removed to Mahon, were fully inhabited; and there are still more gentlemens families here than in all the rest of the island. It hath a port commodious enough for the vessels employed in the trade of this country, which, though in the possession of a maritime power, is less than it formerly was. It is still, in the style of our officers, *the best quarters* (and there are none bad) in the country; and if there was a civil government, and the place made a free port, the best judges are of opinion it would very soon become a flourishing place again; and the fortifications, if it should be found necessary, might then also be easily restored and improved.

The termino of Fererias is the next, a narrow slip reaching cross from sea to sea, and the country little cultivated; it is therefore united to Mercandal. In this last termino stands Mont-toro in the very centre of the isle, and the highest ground, some say the only mountain in it; on the summit of which there is a convent, where even in the hottest months the monks enjoy a cool air, and at all times a most delightful prospect. About six miles north from Mont-toro stands the castle that covers Port Fornelles, which is a very spacious harbour on the east side of the island. There are in it shoals and foul ground, which, to those who are unacquainted with them, render it difficult and dangerous; yet the packets bound from Mahon to Marseilles frequently take shelter therein; and while the Spaniards were in possession of the isle, large ships and men of war frequented it. At a small distance from this lies another harbour called *Adaia*, which runs far into the land; but being reputed unsafe, and being so near Fornelles, is at present useless. The country about it is, however, said to be the pleasantest and wholesomest spot in the island, and almost the only one plentifully supplied with excellent spring-water; so that the gardens are well laid out, and the richest and finest fruits grow here in the highest perfection. Alaior is the next termino, in which there is nothing remarkable

Minorca remarkable but the capital of the same name, well situated on an eminence, in a pleasant and tolerably cultivated country.

The termino of Mahon, at the south-east end of the island, is at present the most considerable of them all, containing about 60,000 English acres, and nearly one-half of the inhabitants in Minorca. The town of Mahon derives its name from the Carthaginian general Mago, who is universally allowed to be its founder.—It stands on an eminence on the west side of the harbour, the ascent pretty steep. There are in it a large church, three convents, the governor's palace, and some other public edifices. It is large, but the streets are winding, narrow, and ill paved. The fortress of St Philip stands near the entrance of the harbour, which it covers, is very spacious, of great strength, with subterranean works to protect the garrison from bombs, large magazines, and whatever else is necessary to render it a complete fortification, and hath a numerous and well-disposed artillery. Port Mahon is allowed to be the finest harbour in the Mediterranean, about 90 fathoms wide at its entrance, but within very large and safe, stretching a league or more into the land. Beneath the town of Mahon there is a very fine quay, one end of which is reserved for the ships of war, and furnished with all the accommodations necessary for careening and refitting them; the other serves for merchantmen. On the other side the harbour is Cape Mola, where it is generally agreed a fortress might be constructed which would be impregnable, as the castle of St Philip was esteemed before we took it, and bestowed so much money upon it, that, though some works were erected at Cape Mola, it was not judged proper to proceed in the fortifications there at a fresh expence; at least this is the only reason that hath been assigned. Minorca was taken by the Spaniards during the American war, and is now in their possession.

MINORS, or FRIERS MINOR, an appellation which the Franciscans assume, out of shew of humility; calling themselves *fratres minores*, i. e. lesser brothers, and sometimes *minorites*. There is also an order of regular minors at Naples, which was established in the year 1588, and confirmed by Sixtus V.

MINOS (fab. hist.), a king of Crete, son of Jupiter and Europa. He flourished about 1432 years before the Christian era. He gave laws to his subjects, which still remained in full force in the age of the philosopher Plato, about 1000 years after the death of the legislator. His justice and moderation procured him the appellation of the favourite of the gods, the confident of Jupiter, and the wise legislator, in every city of Greece; and, according to the poets, he was rewarded for his equity after death with the office of supreme and absolute judge in the infernal regions. In this capacity he is represented sitting in the middle of the shades, and holding a sceptre in his hand. The dead plead their different causes before him; and the impartial judge shakes the fatal urn, which is filled with the destinies of mankind. He married Ithone, by whom he had Lycastes, who was the father of Minos II.

MINOS II. was a son of Lycastes, the son of Minos I. and king of Crete. He married Pasiphae, the daughter of Sol and Perseis, and by her he had many

children. He increased his paternal dominions by the conquest of the neighbouring islands; but showed himself cruel in the war which he carried against the Athenians, who had put to death his son Androgeus. He took Megara by the treachery of Scylla; and not satisfied with victory, he obliged the vanquished to bring him yearly to Crete seven chosen boys and the same number of virgins to be devoured by the MINOTAUR. This bloody tribute was at last abolished when THESEUS had destroyed the monster. When DÆDALUS, whose industry and invention had fabricated the labyrinth, and whose imprudence in assisting Pasiphae in the gratification of her unnatural desires, had offended Minos, fled from the place of his confinement with wings, and arrived safe in Sicily; the incensed monarch pursued the offender, resolved to punish his infidelity. Cocalus, king of Sicily, who had hospitably received Dædalus, entertained his royal guest with dissembled friendship; and, that he might not deliver to him a man whose ingenuity and abilities he so well knew, he put Minos to death. Minos died about 35 years before the Trojan war. He was father of Androgeus, Glaucus, and Deucalion; and two daughters, Phædra and Ariadne. Many authors have confounded the two Minoses, the grandfather and the grandson; but Homer, Plutarch, and Diodorus, prove plainly that they were two different persons.

MINOTAUR (fab. hist.), a celebrated monster, half a man and half a bull, according to this verse of Ovid,

Semibovemque virum, semivirumque bovem.

It was the fruit of Pasiphae's amour with a bull. Minos refused to sacrifice a white bull to Neptune, an animal which he had received from the god for that purpose. This offended Neptune, and he made Pasiphae the wife of Minos enamoured of this fine bull, which had been refused to his altars. Dædalus prostituted his talents in being subservient to the queen's unnatural desires; and by his means, Pasiphae's horrible passions were gratified, and the Minotaur came into the world. Minos confined in the labyrinth this monster, which convinced the world of his wife's lasciviousness, and reflected disgrace upon his family. The Minotaur usually devoured the chosen young men and maidens which the tyranny of Minos yearly exacted from the Athenians. Theseus delivered his country from this tribute, when it had fallen to his lot to be sacrificed to the voracity of the Minotaur; and by means of Ariadne, the king's daughter, he destroyed the monster, and made his escape from the windings of the labyrinth.—The fabulous tradition of the Minotaur, and of the infamous commerce of Pasiphae with a favourite bull, has been often explained. Some suppose that Pasiphae was enamoured of one of her husband's courtiers called *Taurus*; and that Dædalus favoured the passions of the queen, by suffering his house to become the retreat of the two lovers. Pasiphae some time after brought twins into the world, one of whom greatly resembled Minos and the other *Taurus*; and in the natural resemblance of their countenance with that of their supposed fathers, originated their name, and consequently the fable of the Minotaur.

MINOW, a very small species of cyprinus, so well known that it needs no description.

MIN.

Minotaur,
Minow.

Minster.
Minstrel.

MINSTER (Saxon, *Mynster* or *Mynstre*), anciently signified the church of a monastery or convent.

MINSTREL, an ancient term for a singer and instrumental performer.

The word *minstrel* is derived from the French *menc-srier*, and was not in use here before the Norman conquest. It is remarkable, that our old monkish historians do not use the word *citharedus*, *cantator*, or the like, to express a *minstrel* in Latin; but either *mimus*, *histrio*, *joculator*, or some other word that implies *gesture*. Hence it should seem that the minstrels set off their singing by mimicry or action; or, according to Dr Brown's hypothesis, united the powers of melody, poem, and dance.

The Saxons, as well as the ancient Danes, had been accustomed to hold men of this profession in the highest reverence. Their skill was considered as something divine, their persons were deemed sacred, their attendance was solicited by kings, and they were everywhere loaded with honours and rewards. In short, poets and their art were held among them in that rude admiration which is ever shown by an ignorant people to such as excel them in intellectual accomplishments. When the Saxons were converted to Christianity, in proportion as letters prevailed among them, this rude admiration began to abate, and poetry was no longer a peculiar profession. The poet and the minstrel became two persons. Poetry was cultivated by men of letters indiscriminately, and many of the most popular rhymes were composed amidst the leisure and retirement of monasteries. But the minstrels continued a distinct order of men, and got their livelihood by singing verses to the harp at the houses of the great. There they were still hospitably and respectfully received, and retained many of the honours shown to their predecessors the Bards and Scalds. And indeed, though some of them only recited the compositions of others, many of them still composed songs themselves; and all of them could probably invent a few stanzas on occasion. There is no doubt but most of the old heroic ballads were produced by this order of men. For although some of the larger metrical romances might come from the pen of the monks or others, yet the smaller narratives were probably composed by the minstrels who sung them. From the amazing variations which occur in different copies of these old pieces, it is evident they made no scruple to alter each other's productions, and the reciter added or omitted whole stanzas according to his own fancy or convenience.

In the early ages, as is hinted above, this profession was held in great reverence among the Saxon tribes, as well as among their Danish brethren. This appears from two remarkable facts in history, which show that the same arts of music and song were equally admired among both nations, and that the privileges and honours conferred upon the professors of them were common to both; as it is well known their customs, manners, and even language, were not in those times very dissimilar.

When King Alfred the Great was desirous to learn the true situation of the Danish army, which had invaded his realm, he assumed the dress and character of a minstrel; and taking his harp, and only one attendant (for in the earliest times it was not unusual for a minstrel to have a servant to carry his harp), he

went with the utmost security into the Danish camp. And though he could not but be known to be a Saxon, the character he had assumed procured him a hospitable reception; he was admitted to entertain the king at table, and staid among them long enough to contrive that assault which afterwards destroyed them. This was in the year 878.

About 60 years after, a Danish king made use of the same disguise to explore the camp of King Athelstan. With his harp in his hand, and dressed like a minstrel, Anlaff king of the Danes went among the Saxon tents, and taking his stand near the king's pavilion, began to play, and was immediately admitted. There he entertained Athelstan and his lords with his singing and his music; and was at length dismissed with an honourable reward, though his songs must have discovered him to have been a Dane. Athelstan was saved from the consequences of this stratagem by a soldier, who had observed Anlaff bury the money which had been given him, from some scruple of honour or motive of superstition. This occasioned a discovery.

From the uniform procedure of both these kings, it is plain that the same mode of entertainment prevailed among both people, and that the minstrel was a privileged character among both. Even as late as the reign of Edward II. the minstrels were easily admitted into the royal presence, as appears from a passage in Stow, which also shows the splendor of their appearance.

"In the year 1316, Edward II. did solemnise his feast of Pentecost at Westminster, in the great hall: where sitting royally at the table with his peers about him, there entered a woman adorned like a minstrel, sitting on a great horse trapped, as minstrels then used, who rode round about the tables, showing pastime; and at length came up to the king's table, and laid before him a letter, and forthwith turning her horse, saluted every one, and departed."—The subject of this letter was a remonstrance to the king on the favours heaped by him on his minions, to the neglect of his knights and faithful servants.

The messenger was sent in a minstrel's habit, as what would gain an easy admission; and was a woman concealed under that habit, probably to disarm the king's resentment: for we do not find that any of the real minstrels were of the female sex; and therefore conclude this was only an artful contrivance peculiar to that occasion.

In the 4th year of Richard II. John of Gaunt erected at Tetbury in Staffordshire a court of minstrels, with a full power to receive suit and service from the men of his profession within five neighbouring counties, to enact laws, and determine their controversies; and to apprehend and arrest such of them as should refuse to appear at the said court, annually held on the 16th of August. For this they had a charter, by which they were empowered to appoint a king of the minstrels, with four officers, to preside over them. These were every year elected with great ceremony; the whole form of which is described by Dr Plott: in whose time, however, they seem to have become mere musicians.

Even so late as the reign of King Henry VIII. the reciters of verses or moral speeches learnt by heart, intruded without ceremony into all companies; not only

Minstrel.

Minstrel. only in taverns, but in the houses of the nobility themselves. This we learn from Erasmus, whose argument led him only to describe a species of these men who did not sign their compositions; but the others that did, enjoyed without doubt the same privileges.

We find that the minstrels continued down to the reign of Elizabeth; in whose time they had lost much of their dignity, and were sinking into contempt and neglect. Yet still they sustained a character far superior to any thing we can conceive at present of the singers of old ballads.

When Queen Elizabeth was entertained at Killingworth castle by the earl of Leicester in 1575, among the many devices and pageants which were exhibited for her entertainment, one of the personages introduced was that of an ancient minstrel, whose appearance and dress are so minutely described by a writer there present, and gives us so distinct an idea of the character, that we shall quote the passage at large.

"A person very meet seemed he for the purpose, of a xlv. years old, apparelled partly as he would himself. His cap off: his head seemingly rounded tonsterwise: fair-kembed, that, with a sponge daintly dipt in a little capon's grease, was finely smoothed, to make it shine like a mallard's wing. His beard smugly shaven: and yet his shirt after the new trink, with ruffs fair starched, sleeked and glistering like a pair of new shoes, marshalled in good order with a setting stick, and strut, 'that' every ruff stood up like a wafer. A side [i. e. long] gown of Kendale green, after the freshnes of the year now, gathered at the neck with a narrow gorget, fastened afore with a white clasp and a keeper close up to the chin; but easily, for heat, to undo when he list. Seemingly begirt in a red caddis girdle: from that a pair of capped Sheffield knives hanging a' two sides. Out of his bosom drawn from a lappet of his napkin edged with a blue lace, and marked with a D for Damian; for he was but a batchelor yet.

"His gown had side [i. e. long] sleeves down to mid-leg, slit from the shoulder to the hand, and lined with white cotton. His doublet-sleeves of black worsted: upon them a pair of pointes of tawny chamlet laced along the wrist with blue threaden pointes. A wealt towards the hands of fustian-a-napes. A pair of red neather-stocks. A pair of pumps on his feet, with a cross cut at his toes for corns; not new indeed, yet cleanly blackt with soot, and shining as a shoing horn.

"About his neck a red ribband fuitable to his girdle. His harp in good grace dependent before him. His wrest tyed to a green lace and hanging by: under the gorget of his gown a fair flaggon chain, (pewter for) silver, as a squire Minstrel of Middlesex, that travelled the country this summer season, unto fair and worshipful mens houses. From his chain hung a scutcheon, with metal and colour, resplendent upon his breast, of the ancient arms of Islington."

—This minstrel is described as belonging to that village. We suppose such as were retained by noble families wore their arms hanging down by a silver chain as a kind of badge. From the expression of Squire Minstrel above, we may conclude there were other inferior orders, as Yeomen Minstrels, or the like.

This minstrel, the author tells us a little below, "after three lowly courtesies, cleared his voice with a hem . . . and wiped his lips with the hollow of his hand for 'filing his napkin; tempered a string or two with his wrest; and, after a little warbling on his harp for a prelude, came forth with a solemn song, warranted for story out of King Arthur's acts, &c."

Towards the end of the 16th century, this class of men had lost all credit, and were sunk so low in the public opinion, that in the 39th year of Elizabeth a statute was passed by which "minstrels, wandering abroad," were included among "rogues, vagabonds, and sturdy beggars," and were adjudged to be punished as such. This act seems to have put an end to the profession, for after this time they are no longer mentioned.

MINT, the place in which the king's money is coined. See COINAGE.

There were anciently mints in almost every county in England; but the only mint at present in the British dominions is that in the tower of London. The officers of the mint are, 1. The warden of the mint, who is the chief; he oversees the other officers, and receives the bullion. 2. The master-worker, who receives bullion from the warden, causes it to be melted, delivers it to the moneyers, and, when it is coined, receives it again. 3. The comptroller, who is the overseer of all the inferior officers, and sees that all the money is made to the just assize. 4. The assay-master, who weighs the gold and silver, and sees that it is according to the standard. 5. The two auditors who take the accounts. 6. The surveyor of the melting; who, after the assay-master has made trial of the bullion, sees that it is cast out, and not altered after it is delivered to the melter. 7. The engraver; who engraves the stamps and dyes for the coinage of the money. 8. The clerk of the irons; who sees that the irons are clean and fit to work with. 9. The melter who melts the bullion before it be coined. 10. The provost of the mint; who provides for and oversees all the moneyers. 11. The blanchers, who anneal and cleanse the money. 12. The moneyers; some of whom forge the money, some share it, some round and mill it, and some stamp and coin it. 13. The porters who keep the gate of the mint.

Mint was also a pretended place of privilege, in Southwark, near the King's Bench, put down by statute. If any persons, within the limits of the mint, shall obstruct any officer in the serving of any writ or process, &c. or assault any person therein, so as he receive any bodily hurt, the offender shall be guilty of felony, and be transported to the plantations, &c. Stat. 9. Geo. I.

MINT-Marks. It hath been usual, from old time, to oblige the masters and workers of the mint, in the indentures made with them, "to make a privy mark in all the money that they made, as well of gold as of silver, so that another time they might know, if need were, and witte which moneys of gold and silver among other of the same moneys, were of their own making, and which not." And whereas, after every trial of the pix at Westminster, the masters and workers of the mint, having there proved their moneys to be lawful and good, were immediately entitled to receive their *quietus* under the great seal, and to be discharged.

Mint.

charged from all suits or actions concerning those moneys, it was then usual for the said masters and workers to change the privy mark before used for another, that so the moneys from which they were not yet discharged might be distinguished from those for which they had already received their *quietus*; which new mark they then continued to stamp upon all their moneys, until another trial of the pix gave them also their *quietus* concerning those.

The pix is a strong box with three locks, whose keys are respectively kept by the warden, master, and comptroller of the mint; and in which are deposited, sealed up in several parcels, certain pieces taken at random out of every *journey* as it is called; that is, out of every 15 pounds weight of gold, or 60 pounds weight of silver, before the same is delivered to the proprietors. And this pix is, from time to time, by the king's command, opened at Westminster, in the presence of the lord-chancellor, the lords of the council, the lords-commissioners of the treasury, the justices of the several benches, and the barons of the exchequer; before whom a trial is made, by a jury of goldsmiths impanelled and sworn for that purpose, of the collective weights of certain parcels of the several pieces of gold and silver taken at random from those contained in the pix; after which those parcels being severally melted, assays are then made of the bullion of gold and silver so produced, by the melting certain small quantities of the same against equal weights taken from the respective trial-pieces of gold and silver that are deposited and kept in the exchequer for that use. This is called the *trial of the pix*; the report made by the jury upon that trial is called the *verdict of the pix* for that time; and the indented trial-pieces just abovementioned, are certain plates of standard gold and standard silver, made with the greatest care, and delivered in upon oath, from time to time as there is occasion, by a jury of the most able and experienced goldsmiths, summoned by virtue of a warrant from the lords of the treasury to the wardens of the mystery of goldsmiths of the city of London for that purpose; and which plates being so delivered in, are divided each, at this time, into seven parts by indentures, one of which parts is kept in his majesty's court of exchequer at Westminster, another by the said company of goldsmiths, and two more by the officers of his majesty's mint in the tower; the remaining three being for the use of the mint, &c. in Scotland. The pix has sometimes been tried every year, or even oftener, but sometimes not more than once in several years: and from hence is understood how it comes to pass, that, among the pieces that are dated as well as marked, three or more different dates are sometimes found upon pieces impressed with the same mark; and again, that different marks are found upon pieces bearing the same date. These marks are first observable upon the coins of King Edward III.; the words above quoted concerning those marks are from the indentures made with the lord Hastings, master and worker to King Edward IV.; and the marks themselves continued to be stamped very conspicuously upon the moneys, till the coinage by the mill and screw was introduced and settled after the Restoration, in the year 1662: since which time, the moneys being made with far greater regularity and exactness than

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before, these marks have either been totally laid aside, or such only have been used as are of a more secret nature, and only known to the officers and engravers concerned in the coinage: and indeed the constant practice that has ever since prevailed, of dating all the several pieces, has rendered all such marks of much less consequence than before.

MINT, in botany. See MENTHA.

MINTURNÆ, a town of Campania between Sinuessa and Formiæ. It was in the marshes in this neighbourhood that Marius concealed himself in the mud to avoid the partizans of Sylla. The people condemned him to death; but when his voice alone had terrified the executioner, they showed themselves compassionate and favoured his escape.

MINUET, a very graceful kind of dance, consisting of a coupee, a high step, and a balance: it begins with a beat, and its motion is triple.

The invention of the minuet seems generally to be ascribed to the French, and particularly to the inhabitants of the province of Poictou. The word is said by Menage and Furetiere to be derived from the French *menue* or *menu*, "small, or little;" and in strictness signifies a small pace. The melody of this dance consists of two strains, which, as being repeated, are called *reprises*, each having eight or more bars, but never an odd number. The measure is three crotchets in a bar, and is thus marked $\frac{3}{8}$, though it is commonly performed in the time $\frac{3}{4}$. Walther speaks of a minuet in Lully's opera of *Roland*, each strain of which contains ten bars, the sectional number being 5; which renders it very difficult to dance.

MINUTE, in geometry, the 60th part of a degree of a circle.

MINUTE of Time, the 60th part of an hour.

MINUTE, in architecture, usually denotes the 60th, sometimes the 30th, part of a module. See ARCHITECTURE.

MINUTE is also used for a short memoir, or sketch of a thing taken in writing.

MINUTIUS FELIX. See FELIX.

MINYÆ, a name given to the inhabitants of Orchomenos in Bœotia, from Minyas king of the country. Orchomenos the son of Minyas gave his name to the capital of the country; and the inhabitants still retained their original appellation, in contradistinction to the Orchomenians of Arcadia. A colony of Orchomenians passed into Thessaly and settled in Iolchos; from which circumstance the people of the place, and particularly the Argonauts, were called *Minyæ*. This name they received, according to the opinion of some, not because a number of Orchomenians had settled among them, but because the chief and noblest of them were descended from the daughters of Minyas. Part of the Orchomenians accompanied the sons of Codrus when they migrated to Ionia. The descendants of the Argonauts, as well as the Argonauts themselves, received the name of *Minyæ*. They first inhabited Lemnos, where they had been born from the Lemnian women who had murdered their husbands. They were driven from Lemnos by the Pelasgi, about 1160 before the Christian era, and came to settle in Laconia, from whence they passed into Calliste with a colony of Lacedæmonians.

5

MIQUELETS,

Mint
||
Minyæ

Miquelets ||
Mirabilis. MIQUELETS, a name given to the Spaniards who inhabit the Pyrenean mountains on the frontiers of Arragon and Catalonia, and live by robbing.

MIQUELON, a small desert island to the south-west of Cape May in Newfoundland, ceded to the French by the peace of 1763, for drying and curing their fish. W. Long. 54. 30. N. Lat. 47. 22.

MIRABILIS, MARVEL OF PERU: A genus of the monogynia order, belonging to the pentandria class of plants; and in the natural method ranking with those of which the order is doubtful. The corolla is funnel-shaped above; the calyx inferior; the nectarium globular, containing the germen. The most remarkable species are,

1. The jalappa, or common marvel of Peru. It has a large, thick, fleshy root; an upright, thick, jointed stalk, dividing and branching numerously, widely, and erectly, a yard or more high; garnished with oblong, broad, opposite leaves; and all the branches and shoots terminated by numerous flowers in clusters, of different colours in the varieties. Of this there are varieties with white flowers—with yellow flowers—with purple flowers—with red flowers—with white and yellow flowers—white and purple flowers—purple and yellow flowers—red and yellow flowers. Several other varieties often rise from seed; and it is remarkable, that although several of the above colours and variegations are sometimes common to the same plant, yet it is rare that a plant of this species produces flowers of one of those colours alone; sometimes, however, the same plant will exhibit only white and purple flowers separate, and sometimes both colours in the same flowers, intermixed with the plain ones: the same is also observable in the red and yellow; others have plain flowers of several different colours, and sometimes variegated flowers also on the same plants. This species has a large tap root, which, when cut across, is not unlike that of the true jalap; but, when dried, is white, light, and spongy.

2. The longiflora, or long-flowered mirabilis, hath a large, thick, fleshy root; a thick stalk, dividing low into many declinated spreading branches, extending two or three feet every way; large, heart-formed, hairy, viscous leaves, in opposite pairs; and all the branches and shoots terminated by white flowers in clusters, having very long tubes, nodding downward.

3. The dichotoma, dichotomous, or forked mirabilis, has a thick fleshy root: an upright, thick, swollen, jointed stem, branching forkedly two or three feet high; oblong opposite leaves; and smallish red flowers at the axillas, singly and close-sitting.

All these plants flower in July, continuing in plentiful succession until October, very conspicuous and elegant. They have the singularity of being shut all day, and expanding towards the evening when the sun declines; hence the inhabitants of the Indies, where they grow naturally, called them *four o'clock flowers*: their time of opening here, however, depends on the weather; for if cloudy, or that the sun is not very vehement, they often open great part of the day. They are naturally perennial in root; but in this country are commonly considered as annuals: for they rise from seed in the spring, and the same year produce flowers and perfect seed; and if left to nature in the open air, totally perish in winter, at the first

attack of frost or excessive wet. If in autumn, however, when the stalks begin to assume a state of decay, the roots are taken up, and preserved in sand in a dry room all winter, and planted again in spring, they shoot out afresh stronger than at first, and sometimes obtain four or five feet stature, with very spreading heads; or if plants growing in pots, having the stems cut down in autumn, and the pots placed in a green-house, or garden-frames under glasses, the roots may also be preserved sound, and will shoot out again in spring as above.

The roots of all these plants are purgative; but require to be given in a great quantity to operate equal to the true jalap, which is a species of convolvulus. See *CONVOLVULUS*.

MIRACLE, in its original sense, is a word of the same import with *wonder*; but in its usual and more appropriate signification, it denotes “an effect contrary to the established constitution and course of things, or a sensible deviation from the known laws of nature.”

That the visible world is governed by stated general rules, or that there is an order of causes and effects established in every part of the system of nature which falls under our observation, is a fact which cannot be controverted. If the Supreme Being, as some have supposed, be the only real agent in the universe, we have the evidence of experience, that, in the particular system to which we belong, he acts by stated rules. If he employs inferior agents to conduct the various motions from which the phenomena result, we have the same evidence that he has subjected those agents to certain fixed laws, commonly called the *laws of nature*. On either hypothesis, effects which are produced by the regular operation of these laws, or which are conformable to the established course of events, are properly called *natural*; and every contradiction to this constitution of the natural system, and the correspondent course of events in it, is called a *miracle*.

If this definition of a miracle be just, no event can be deemed miraculous merely because it is strange, or even to us unaccountable; since it may be nothing more than a regular effect of some unknown law of nature. In this country earthquakes are rare; and for monstrous births perhaps no *particular* and satisfactory account can be given: yet an earthquake is as regular an effect of the established laws of nature as any of those with which we are most intimately acquainted; and under circumstances in which there would always be the same kind of production, the monster is nature's genuine issue. It is therefore necessary, before we can pronounce any effect to be a true miracle, that the circumstances under which it is produced be known, and that the common course of nature be in some degree understood; for in all those cases in which we are totally ignorant of nature, it is impossible to determine what is, or what is not, a deviation from its course. Miracles, therefore, are not, as some have represented them, appeals to our ignorance. They suppose some antecedent knowledge of the course of nature, without which no proper judgment can be formed concerning them; though with it their reality may be so apparent as to prevent all possibility of a dispute.

Miracle.

Miracle.

Thus, were a physician to cure a blind man of a cataract, by anointing his eyes with a chemical preparation which we had never before seen, and to the nature and effects of which we are absolute strangers, the cure would undoubtedly be *wonderful*; but we could not pronounce it *miraculous*, because, for any thing known to us, it might be the natural effect of the operation of the unguent on the eye. But were he to recover his patient merely by commanding him to see, or by anointing his eyes with spittle, we should with the utmost confidence pronounce the cure to be a miracle; because we know perfectly that neither the human voice nor human spittle have, by the established constitution of things, any such power over the diseases of the eye. No one is now ignorant, that persons apparently dead are often restored to their families and friends, by being treated in the manner recommended by the Humane Society. To the vulgar, and sometimes even to men of science, these effects appear very wonderful; but as they are known to be produced by physical agency, they can never be considered as miraculous deviations from the laws of nature. On the other hand, no one could doubt of his having witnessed a real miracle who had seen a person that had been four days dead come alive out of his grave at the call of another, or who had even beheld a person exhibiting all the *symptoms* of death instantly resuscitated merely by being *desired* to live.

Thus easy is it, in all cases in which the course of nature is understood, to determine whether any particular event be really a miracle; whilst in circumstances where we know nothing of nature and its course, even a true miracle, were it performed, could not be admitted as such, or carry any conviction to the mind of a philosopher.

If miracles be effects contrary to the established constitution of things, we are certain that they will never be performed on trivial occasions. The constitution of things was established by the Creator and Governor of the universe, and is undoubtedly the offspring of infinite wisdom pursuing a plan for the best of purposes. From this plan no deviation can be made but by God himself, or by some powerful being acting with his permission. The plans devised by wisdom are steady in proportion to their perfection, and the plans of infinite wisdom must be absolutely perfect. From this consideration, some men have ventured to conclude, that no miracle was ever wrought, or can rationally be expected; but maturer reflection must soon satisfy us that all such conclusions are hasty.

Man is unquestionably the principal creature in this world, and apparently the only one in it who is capable of being made acquainted with the relation in which he stands to his Creator. We cannot, therefore, doubt, but that such of the laws of nature as extend not their operation beyond the limits of this earth were established chiefly, if not solely, for the good of mankind; and if, in any particular circumstances, that good can be more effectually promoted by an occasional

deviation from those laws, such a deviation may be reasonably expected. Were man, in the exercise of his mental and corporeal powers, subjected to the laws of physical necessity, the circumstances supposed would indeed never occur, and of course no miracle could be admitted. But such is not the nature of man.

Without repeating what has been said elsewhere (See METAPHYSICS, Part III. chap. v.) of necessity and liberty, we shall here take it for granted, that the relation between motives and actions is different from that between cause and effect in physics; and that, mankind have such command over themselves, as that by their voluntary conduct, they can make themselves in a great degree either happy or miserable. We know likewise from history, that, by some means or other, almost all mankind were once sunk into the grossest ignorance of the most important truths; that they knew not the Being by whom they were created and supported; that they paid divine adoration to flocks, stones, and the vilest reptiles; and that they were slaves to the most impious, cruel, and degrading superstitions.

From this depraved state it was surely not unworthy of the common "Father of all" to rescue his helpless creatures, to enlighten their understandings that they might perceive what is right, and to present to them motives of sufficient force to engage them in the practice of it. But the understandings of ignorant barbarians cannot be enlightened by arguments; because of the force of such arguments as regard moral science they are not qualified to judge. The philosophers of Athens and Rome inculcated, indeed, many excellent moral precepts, and they sometimes ventured to expose the absurdities of the reigning superstition: but their lectures had no influence upon the multitude; and they had themselves imbibed such erroneous notions respecting the attributes of the Supreme Being, and the nature of the human soul, and converted those notions into first principles, of which they would not permit an examination, that even among them a thorough reformation was not to be expected from the powers of reasoning. It is likewise to be observed, that there are many truths of the utmost importance to mankind, which unassisted reason could never have discovered. Amongst these we may confidently reckon the immortality of the soul, the terms upon which God will be reconciled to sinners, and the manner in which that all-perfect Being may be acceptably worshipped; about all of which philosophers were in such uncertainty, that, according to Plato, "Whatever is set right, and as it should be, in the present evil state of the world, can be so only by the particular interposition of God (A)."

An immediate revelation from Heaven, therefore, was the only method by which infinite wisdom and perfect goodness could reform a bewildered and vicious race. But this revelation, at whatever time we suppose it given, must have been made directly either to some chosen individuals commissioned to instruct others, or to every man and woman for whose benefit it was ultimately intended. Were every person instructed in

Miracle.

(A) Εὐ γὰρ χρὴ εἶδεναι, ὅ, τι περὶ ἀνθρώπων τε καὶ γένους οἰόντος δει, ἐν τοιαύτῃ κακαστάσει πολιτῶν. Θεοῦ μοι γὰρ αὐτὸ σῶσαι. De republ. lib. 6.

Miracle. in the knowledge of his duty by immediate inspiration, and were the motives to practise it brought home to his mind by God himself, human nature would be wholly changed: men would not be masters of their own actions; they would not be moral agents, nor by consequence be capable either of reward or of punishment. It remains, therefore, that if God has been graciously pleased to enlighten and reform mankind, without destroying that moral nature which is essential to virtue, he can have done it only by revealing his truth to certain chosen instruments, who were the immediate instructors of their contemporaries, and through them have been the instructors of succeeding ages.

Let us suppose this to have been actually the case, and consider how those inspired teachers could communicate to others every truth which had been revealed to themselves. They might easily, if it was part of their duty, deliver a sublime system of natural and moral science, and establish it upon the common basis of experiment and demonstration; but what foundation could they lay for those truths which unassisted reason cannot discover, and which, when they are revealed, appear to have no necessary relation to any thing previously known? To a bare affirmation that they had been immediately received from God, no rational being could be expected to assent. The teachers might be men of known veracity, whose simple assertion would be admitted as sufficient evidence for any fact, in conformity with the laws of nature; but as every man has the evidence of his own consciousness and experience that revelations from heaven are deviations from these laws, an assertion so apparently extravagant would be rejected as false, unless supported by some better proof than the mere affirmation of the teacher. In this state of things, we can conceive no evidence sufficient to make such doctrines be received as the truths of God, but the power of working miracles committed to him who taught them. This would, indeed, be fully adequate to the purpose. For if there were nothing in the doctrines themselves impious, immoral, or contrary to truths already known, the only thing which could render the teacher's assertion incredible, would be its implying such an intimate communion with God as is contrary to the established course of things, by which men are left to acquire all their knowledge by the exercise of their own faculties.—Let us now suppose some of those inspired teachers to tell his countrymen, that he did not desire them, on his *ipse dixit*, to believe that he had any preternatural communion with the Deity, but that for the truth of his assertion he would give them the evidence of their own senses; and after this declaration let us suppose him immediately to raise a person from the dead in their presence, merely by calling upon him to come out of his grave. Would not the only possible objection to the man's veracity be removed by this miracle? and his assertion that he had received such and such doctrines from God be as fully credited, as if it related to the most common occurrence? Undoubtedly it would; for when so much preternatural power was visibly communicated to this person, no one could have reason to question his having received an equal portion of preternatural knowledge. A palpable deviation from the known laws of nature, in one instance, is a sensible proof that such a deviation is possible in another; and

in such a case as this it is the witness of God to the truth of a man. **Miracle.**

Miracles, then, under which we include prophecy, are the only direct evidence which can be given of divine inspiration. When a religion, or any religious truth, is to be revealed from heaven, they appear to be absolutely necessary to enforce its reception among men; and this is the only case in which we can suppose them necessary, or believe for a moment that they ever have been or will be performed.

The history of almost every religion abounds with relations of prodigies and wonders, and of the intercourse of men with the gods; but we know of no religious system, those of the Jews and Christians excepted, which appealed to miracles as the sole evidence of its truth and divinity. The pretended miracles mentioned by Pagan historians and poets are not said to have been publicly wrought to enforce the truth of a new religion contrary to the reigning idolatry. Many of them may be clearly shown to have been mere natural events; (see MAGIC). Others of them are represented as having been performed in secret on the most trivial occasions, and in obscure and fabulous ages long prior to the era of the writers by whom they are recorded. And such of them as at first view appear to be best attested, are evidently tricks contrived for interested purposes; to flatter power, or to promote the prevailing superstitions. For these reasons, as well as on account of the immoral character of the divinities by whom they are said to have been wrought, they are altogether unworthy of examination, and carry in the very nature of them the completest proofs of falsehood and imposture.

But the miracles recorded of Moses and of Christ bear a very different character. None of them is represented as wrought on trivial occasions. The writers who mention them were eye-witnesses of the facts; which they affirm to have been performed publicly, in attestation of the truth of their respective systems. They are indeed so incorporated with these systems, that the miracles cannot be separated from the doctrines; and if the miracles were not really performed, the doctrines cannot possibly be true. Besides all this, they were wrought in support of revelations which opposed all the religious systems, superstitions, and prejudices, of the age in which they were given: a circumstance which of itself sets them, in point of authority, infinitely above the Pagan prodigies, as well as the lying wonders of the Romish church.

It is indeed, we believe, universally admitted, that the miracles mentioned in the book of Exodus and in the four Gospels, might, to those who saw them performed, be sufficient evidence of the divine inspiration of Moses and of Christ; but to us it may be thought that they are no evidence whatever, as we must believe in the miracles themselves, if we believe in them at all, upon the bare authority of human testimony. Why, it has been sometimes asked, are not miracles wrought in all ages and countries? If the religion of Christ was to be of perpetual duration, every generation of men ought to have complete evidence of its truth and divinity.

To the performance of miracles in every age and in every country, perhaps the same objections lie as to the immediate inspiration of every individual. Were those

Miracle. those miracles universally received as such, men would be so overwhelmed with the *nature* rather than with the *force* of their authority, as hardly to remain masters of their own conduct; and in that case the very end of all miracles would be defeated by their frequency. The truth, however, seems to be, that miracles so frequently repeated would not be received as such, and of course would have *no* authority; because it would be difficult, and in many cases impossible, to distinguish them from natural events. If they recurred regularly at certain intervals, we could not prove them to be deviations from the known laws of nature, because we should have the same experience for the one series of events as for the other; for the regular succession of preternatural effects, as for the established constitution and course of things.

Be this, however, as it may, we shall take the liberty to affirm, that for the reality of the Gospel miracles we have evidence as convincing to the reflecting mind, though not so striking to vulgar apprehension, as those had who were contemporary with Christ and his apostles, and actually saw the mighty works which he performed. To the admirers of Mr Hume's philosophy this assertion will appear an extravagant paradox; but we hope to demonstrate its truth from principles which, consistently with himself, that author could not have denied. He has indeed endeavoured

* *Essay on Miracles.*

to prove *, that "no testimony is sufficient to establish a miracle;" and the reasoning employed for this purpose is, that "a miracle being a violation of the laws of nature, which a firm and unalterable experience has established, the proof against a miracle, from the very nature of the fact, is as entire as any argument from experience can be; whereas our experience of human veracity, which (according to him) is the sole foundation of the evidence of testimony, is far from being uniform, and can therefore never preponderate against that experience which admits of no exception." This boasted and plausible argument has with equal candour and acuteness been examined by Dr Campbell †; who justly observes, that so far is experience from being the sole foundation of the evidence of testimony, that, on the contrary, testimony is the sole foundation of by far the greater part of what Mr Hume calls firm and unalterable experience; and that if in certain circumstances we did not give an implicit faith to testimony, our knowledge of events would be confined to those which had fallen under the immediate observation of our own senses. For a short view of this celebrated controversy, in which the Christian so completely vanquishes the philosopher, see the word ABRIDGEMENT.

† *Dissertation on Miracles.*

But though Dr Campbell has exposed the sophistry of his opponent's reasoning, and overturned the *principles* from which he reasons, we are persuaded that he might safely have joined issue with him upon those very principles. To us, at least, it appears that the testimony upon which we receive the Gospel miracles is precisely of that kind which Mr Hume has acknowledged sufficient to establish even a miracle. "No testimony (says he) is sufficient to establish a miracle, unless the testimony be of such a kind that its falsehood would be more miraculous than the fact which it endeavours to establish. When one tells me that he saw a dead man restored to life, I immediately confi-

der with myself whether it be more probable that this person should either deceive or be deceived, or that the fact which he relates should really have happened. I weigh the one miracle against the other; and according to the superiority which I discover I pronounce my decision, and always reject the greater miracle." In this passage every reader may remark what did not escape the perspicacious eye of Dr Campbell, a strange confusion of terms: but as all miracles are equally easy to the Almighty; and as Mr Hume has elsewhere observed, that "the raising of a feather, when the wind wants ever so little of a force requisite for that purpose, is as real a miracle as the raising of a house or a ship into the air;" candour obliges us to suppose, that by talking of greater and less miracles, and of always rejecting the *greater*, he meant nothing more but that of two deviations from the known laws of nature he always rejects that which in itself is least probable.

If, then, we can show that the testimony given by the apostles and other first preachers of Christianity to the miracles of their Master would, upon the supposition that those miracles were not really performed, have been as great a deviation from the known laws of nature as the miracles themselves, the balance must be considered as evenly poised by opposite miracles; and whilst it continues so, the judgment must remain in a state of suspense. But if it shall appear, that in this case the false testimony would have been a deviation from the laws of nature less probable in itself than the miracles recorded in the Gospels, the balance will be instantly destroyed; and by Mr Hume's maxim we shall be obliged to reject the supposition of falsehood in the testimony of the apostles, and admit the miracles of Christ to have been really performed.

In this argument we need not waste time in proving that those miracles, as they are represented in the writings of the New Testament, were of such a nature, and performed before so many witnesses, that no imposition could possibly be practised on the senses of those who affirm that they were present. From every page of the Gospels this is so evident, that the philosophical adversaries of the Christian faith never suppose the apostles to have been themselves deceived, but boldly accuse them of bearing false witness. But if this accusation be well founded, their testimony itself is as great a miracle as any which they record of themselves or of their Master.

It has been shown elsewhere (see METAPHYSICS, n° 138.), that by the law of association, which is one of the laws of nature, mankind, in the very process of learning to speak, necessarily learn to speak the truth; that ideas and relations are in the mind of every man so closely associated with the words by which they are expressed in his native tongue, and in every other language of which he is master, that the one cannot be entirely separated from the other; that therefore no man can on any occasion speak falsehood without some *effort*; that by no effort can a man give consistency to an unpremeditated detail of falsehood, if it be of any length, and include a number of particulars; and that it is still less possible for several men to agree in such a detail, when at a distance from each other, and cross-questioned by their enemies.

This being the case, it follows, if the testimony of the

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Miracle. the apostles to their own and their Master's miracles be false, either that they must have concerted a consistent scheme of falsehood, and agreed to publish it at every hazard; or that God, or some powerful agent appointed by him, must have dissolved all the associations formed in their minds between ideas of sense and the words of language, and arbitrarily formed new associations, all in exact conformity to each other, but all in direct contradiction to truth. One or other of these events must have taken place; because, upon the supposition of falsehood, there is no other alternative. But such a dissolution and formation of associations as the latter implies, must, to every man who shall attentively consider it, appear to be as real a miracle, and to require as great an exertion of power, as the resurrection of the dead. Nor is the supposed voluntary agreement of the apostles in a scheme of falsehood an event less miraculous. When they sat down to fabricate their pretended revelation, and to contrive a series of miracles to which they were unanimously to appeal for its truth, it is plain, since they proved successful in their daring enterprise, that they must have clearly foreseen every possible circumstance in which they could be placed, and have prepared consistent answers to every question that could be put to them by their most inveterate and most enlightened enemies; by the statesman, the lawyer, the philosopher, and the priest. That such foreknowledge as this would have been miraculous, will not surely be denied; since it forms the very attribute which we find it most difficult to allow even to God himself. It is not, however, the *only* miracle which this supposition would compel us to swallow. The very resolution of the apostles to propagate the belief of false miracles in support of such a religion as that which is taught in the New Testament, is as great a miracle as human imagination can easily conceive.

When they formed this design, either they must have hoped to succeed, or they must have foreseen that they should fail in their undertaking; and in either case, they *chose evil for its own sake*. They could not, if they foresaw that they should fail, look for any thing but that contempt, disgrace, and persecution, which were then the inevitable consequences of an unsuccessful endeavour to overthrow the established religion. Nor could their prospects be brighter upon the supposition of their success. As they knew themselves to be false witnesses and impious deceivers, they could have no hopes beyond the grave; and by determining to oppose all the religious systems, superstitions, and prejudices of the age in which they lived, they wilfully exposed themselves to inevitable misery in the present life, to insult and imprisonment, to stripes and death. Nor can it be said that they might look forward to power and affluence when they should, through sufferings, have converted their countrymen; for so desirous were they of obtaining nothing but *misery* as the end of their mission, that they made their own persecution a test of the truth of their doctrines. They introduced the Master from whom they pretended to have received these doctrines as telling them, that "they were sent forth as sheep in the midst of wolves; that they should be delivered up to councils, and scourged in synagogues; that they should be hated of all men for his name's sake; that the bro-

ther should deliver up the brother to death, and the father the child; and that he who took not up his cross and followed after him was not worthy of him." The very system of religion, therefore, which they invented and resolved to impose upon mankind, was so contrived, that the worldly prosperity of its first preachers, and even their exemption from persecution, was incompatible with its success. Had these clear predictions of the Author of that religion, under whom the apostles acted only as ministers, not been verified, all mankind must have instantly perceived that their pretence to inspiration was false, and that Christianity was a scandalous and impudent imposture. All this the apostles could not but foresee when they formed their plan for deluding the world. Whence it follows, that when they resolved to support their pretended revelation by an appeal to forged miracles, they wilfully, and with their eyes open, exposed themselves to inevitable misery, whether they should succeed or fail in their enterprise; and that they concerted their measures so as not to admit of a possibility of recompence to themselves, either in this life or in that which is to come. But if there be a law of nature, for the reality of which we have better evidence than we have for others, it is, that "no man can choose misery for its *own sake*," or make the acquisition of it the ultimate end of his pursuit. The existence of other laws of nature we know by testimony and our own observation of the regularity of their effects. The existence of this law is made known to us not only by these means, but also by the still clearer and more conclusive evidence of our own consciousness.

Thus, then, do miracles force themselves upon our assent in every possible view which we can take of this interesting subject. If the testimony of the first preachers of Christianity was true, the miracles recorded in the Gospel were certainly performed, and the doctrines of our religion are derived from heaven. On the other hand, if that testimony was false, either God must have miraculously effaced from the minds of those by whom it was given all the associations formed between their sensible ideas and the words of language, or he must have endowed those men with the gift of prescience, and have impelled them to fabricate a pretended revelation for the purpose of deceiving the world, and involving themselves in certain and foreseen destruction.

The power necessary to perform the one series of these miracles may, for any thing known to us, be as great as that which would be requisite for the performance of the other; and considered merely as exertions of preternatural power, they may seem to balance each other, and to hold the mind in a state of suspense. But when we take into consideration the different purposes for which these opposite and contending miracles were wrought, the balance is instantly destroyed. The miracles recorded in the Gospels, if real, were wrought in support of a revelation which, in the opinion of all by whom it is received, has brought to light many important truths which could not otherwise have been made known to men; and which, by the confession of its adversaries, contains the purest moral precepts by which the conduct of mankind was ever directed. The opposite series of miracles, if real, was performed to enable, and even

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to compel, a company of Jews, of the lowest rank and of the narrowest education, to fabricate, with the view of inevitable destruction to themselves, a consistent scheme of falsehood, and by an appeal to forged miracles to impose it upon the world as a revelation from heaven. The object of the former miracles is worthy of a God of infinite wisdom, goodness, and power. The object of the latter is absolutely inconsistent with wisdom and goodness, which are demonstrably attributes of that Being by whom alone miracles can be performed. Whence it follows, that the supposition of the apostles bearing *false* testimony to the miracles of their Master, implies a series of deviations from the laws of nature infinitely less probable in themselves than those miracles: and therefore, by Mr Hume's maxim, we must necessarily reject the supposition of falsehood in the testimony, and admit the reality of the miracles. So true is it, that for the reality of the Gospel-miracles we have evidence as convincing to the reflecting mind, as those had who were contemporary with Christ and his apostles, and were actual witnesses to their mighty works.

MIRANDA-DE-EBRO, a town of Spain in Old Castile, with a strong castle; seated in a country that produces excellent wine. The town is divided into two parts by the river, over which there is a handsome bridge. W. Long. 3. 10. N. Lat. 42. 52.

MIRANDE, a town of Gascony in France, capital of the county of Astarac; seated on a mountain near the river Baube. E. Long. 0. 21. N. Lat. 42. 53.

MIRANDO-DE-DOURO, or *Duero*, a strong town of Portugal, and capital of the province of Tra-los-Montes, with a bishop's see. It is well fortified, and seated on a rock near the confluence of the river Douro and Frefna. W. Long. 5. 40. N. Lat. 41. 30.

MIRANDOLA, a town of Italy, and capital of a duchy of the same name, situated between the duchies of Mantua and Modena. It is a pretty large place, well fortified, and has also a strong citadel and fort. It has been several times taken and retaken; the last time by the king of Sardinia in 1742. E. Long. 11. 5. N. Lat. 44. 52.

MIRANDULA. See PICUS.

MIREVELT (Michael Jansen), portrait-painter, was the son of a goldsmith, and born at Delft in 1568. His father, perceiving his early inclination for the arts, placed him at first with one of the Wierixes, of whom he learned to draw in crayons and to engrave. At the age of twelve he executed a print of the Samaritan woman; and not long after a figure of Judith holding the head of Holofernes. These juvenile performances attracted the notice of Anthony Blockland, an historical painter of great note; and under his instructions Mirevelt took up the pencil. He was very successful in his attempts at painting history; but finding portraits to be more profitable, he quitted the former by degrees, and applied himself to portrait painting only. His reputation, according to De Piles, was so great, that he exacted what price for his pictures he pleased, never taking less than 150 florins a piece. The portraits drawn and painted by this artist are exceedingly numerous; and many of them were excellently engraved by William James Delft, his near relation, a very skilful artist. He died in 1641.

MIREVELT (Peter), son of Michael, was born at

Delft in 1596, and died in 1632. In his manner of design, in his style of colouring, and in the delicacy of his pencil, he exactly resembled his father; and by the best judges of that time he was accounted to be in no degree inferior to him.

MIRIAM, sister of Aaron and Moses, makes two or three remarkable appearances in scripture. It was owing to her that her mother was employed by Pharaoh's daughter as nurse to Moses. She put herself at the head of the women of Israel after their passage through the Red Sea, in order to sing the song which the men had sung before. She joined with her brother Aaron in murmuring against Moses, and was severely chastised for that action; for she became leprous, and continued separate from the rest without the camp for seven days. She died before her brothers, though in the same year with them, and was buried at the public expence.

MIRROR, a name for a looking glass, or any polished body, whose use is to form the images of distant objects, by reflection of the rays of light. See REFLECTION.

Mirrors are either plain, convex, or concave. The first reflect the rays of light in a direction exactly similar to that in which they fall upon them, and therefore represent bodies of their natural magnitude. The convex ones make the rays diverge much more than before reflection, and therefore greatly diminish the images of those objects which they show: while the concave ones, by collecting the rays into a focus, not only magnify the objects they show, but will burn very fiercely when exposed to the rays of the sun; and hence they are commonly known by the name of *burning mirrors*. See *BURNING-Mirrors*.

In ancient times the mirrors were made of some kind of metal; and from a passage in the Mosaic writings we learn that the mirrors used by the Jewish women were made of brass. The Jews certainly had been taught to use that kind of mirrors by the Egyptians; from whence it is probable that brazen mirrors were the first kind used in the world. Any kind of metal, indeed, when well polished, will reflect very powerfully; but of all others silver reflects the most, tho' it has been in all countries too expensive a material for common use. Gold also is very powerful; and metals, or even wood, gilded and polished, will act very powerfully as burning mirrors. Even polished ivory, or straw nicely plaited together, will form mirrors capable of burning, if on a large scale.

Since the invention of glass, and the application of quicksilver to it, became generally known, it hath been universally employed for those plain mirrors used as ornaments to houses; but in making reflecting telescopes, they have been found much inferior to metallic ones. It doth not appear that the same superiority belongs to the metalline burning mirrors, considered merely as burning glasses; since the mirror with which Mr Macquer melted platina, though only 22 inches diameter, and which was made of quicksilvered glass, produced much greater effects than M. Vilette's metalline speculum, which considerably exceeded it in size. It is very probable, however, that this mirror of M. Vilette's was by no means so well polished as it ought to have been; as the art of preparing the metal for taking the finest polish has but lately been discovered and published in the Philosophical Transactions

Miram,
Mirror.

Mire-crow tions by Mr Mudge. See *Glass-Grinding*, and the
 || *Mechanical Part* of OPTICS.

Mischna. MIRE-CROW, SEA-CROW, or *Pewit*. See LA-
 RUS.

MISADVENTURE, in common language, signi-
 fies any unlucky accident which takes place without
 being foreseen.

MISADVENTURE, in law, has an especial signification
 for the killing a man partly by negligence, and partly
 by chance. See HOMICIDE.

MISANTHROPY (formed *μισος*, *hatred*, and *αν-
 θρωπος*, a man); a general dislike or aversion to man,
 and mankind. In which sense it stands opposed to
philanthropy, or the love of mankind.

MISCARRIAGE. See ABORTION and MID-
 WIFERY.

MISCHNA, or MISNA, (from *שנן*, *iteravit*), a part
 of the Jewish Talmud.

The Mischna contains the text; and the Gemara,
 which is the second part of the Talmud, contains the
 commentaries: so that the Gemara is, as it were, a
 glossary on the Mischna.

The Mischna consists of various traditions of the
 Jews, and of explanations of several passages of scrip-
 ture: these traditions serving as an explication of the
 written law, and supplement to it, are said to have
 been delivered to Moses during the time of his abode
 on the Mount; which he afterwards communicated
 to Aaron, Eleazar, and his servant Joshua. By these
 they were transmitted to the 70 elders, by them to
 the prophets, who communicated them to the men of
 the great sanhedrim, from whom the wise men of Je-
 rusalem and Babylon received them. According to
 Prideaux's account, they passed from Jeremiah to Ba-
 ruch, from him to Ezra, and from Ezra to the men
 of the great synagogue, the last of whom was Simon
 the Just; who delivered them to Antigonus of Socho:
 and from him they came down in regular succession
 to Simeon, who took our Saviour in his arms; to Ga-
 maliel, at whose feet Paul was educated; and last
 of all to Rabbi Judah the Holy, who committed
 them to writing in the Mischna. But Dr Prideaux,
 rejecting this Jewish fiction, observes, that after the
 death of Simeon the Just, about 299 years before
 Christ, the Mischnical doctors arose, who, by their
 comments and conclusions, added to the number of
 those traditions which had been received and allowed
 by Ezra and the men of the great synagogue; so that
 towards the middle of the second century after Christ,
 under the empire of Antoninus Pius, it was found
 necessary to commit these traditions to writing; more
 especially, as their country had considerably suffered
 under Adrian, and many of their schools had been
 dissolved, and their learned men cut off; and there-
 fore the usual method of preserving their traditions
 had failed. Rabbi Judah on this occasion being rec-
 tor of the school at Tiberias, and president of the
 sanhedrim in that place, undertook the work, and
 compiled it in six books, each consisting of several
 tracts, which altogether make up the number of 63.
Prid. Conned. vol. ii. p. 468, &c. ed. 9. This
 learned author computes, that the Mischna was com-
 posed about the 150th year of our Lord; but Dr
 Lightfoot says, that Rabbi Judah compiled the
 Mischna about the year of Christ 190, in the latter
 end of the reign of Commodus; or, as some compute,

in the year of Christ 220. Dr Lardner is of opi-
 nion, that this work could not have been finished be-
 fore the year 190, or later. *Collect. of Jewish and
 Heathen Testimonies*, &c. vol. i. p. 178. Thus the
 book called the *Mischna* was formed; a book which
 the Jews have generally received with the greatest ve-
 neration. The original has been published with a
 Latin translation by Surenhusius, with notes of his
 own, and others from the learned Maimonides, &c.
 in 6 vols. fol. Amsterd. A. D. 1698—1703. (See
 TALMUD). It is written in a much purer style, and
 is not near so full of dreams and visions as the Ge-
 mara.

MISDEMEANOUR, in law, signifies a crime.
 Every crime is a misdemeanour; yet the law has made
 a distinction between crimes of an higher and a lower
 nature; the latter being denominated *misdemeanours*,
 the former *felonies*, &c. For the understanding of which
 distinction, we shall give the following definition from
 Blackstone's Commentaries, vol. iv. 5.

"A crime, or misdemeanour, is an act committed
 or omitted, in violation of a public law, either forbid-
 ding or commanding it. This general definition com-
 prehends both *crimes* and *misdemeanours*; which, pro-
 perly speaking, are mere synonymous terms; though,
 in common usage, the word *crime* is made to denote
 such offences as are of a deeper and more atrocious dye;
 while smaller faults, and omissions of less consequence,
 are comprised under the gentler name of *misdemeanours*
 only."

MISE, in law-books, is used in various senses:
 thus it sometimes signifies costs or expences; in which
 sense it is commonly used in entering of judgments in
 actions personal. It is also used for the issue to be tried
 on the grand assize; in which case, joining of the mise
 upon the mere right, is putting in issue between the
 tenant and demandant, Who has the best or clearest
 right.

MISE also signifies a tax or tallage, &c. An ho-
 norary gift, or customary present from the people of
 Wales to every new king or prince of Wales, ancient-
 ly given in cattle, wine, and corn, but now in money,
 being 5000*l.* or more, is denominated a *mise*: so
 was the usual tribute or fine of 3000 merks paid by the
 inhabitants of the county palatine of Chester at the
 change of every owner of the said earldoms, for enjoy-
 ing their liberties. And at Chester they have a mise-
 book, wherein every town and village in the county
 is rated what to pay towards the mise. The 27
 Hen. VIII. c. 26. ordains that lords shall have all
 such mises and profits of their lands as they had in
 times past, &c.

MISE, is sometimes also corruptly used for *mease*, in
 law French *mees*, "a messuage;" as a *mise place*, in
 some manors, is such a messuage or tenement as an-
 swers the lord a heriot at the death of its owner.
 2. *Inst.* 528.

MISENUM, or MISENUS, (anc. geog.); a pro-
 montory, port, and town in Campania, situated to
 the south-west of Baiæ, in the Sinus Puteolanus, on
 the north side. Here Augustus had a fleet, called
Classis Misensis, for guarding the Mare Inferum; as
 he had another at Ravenna for the Superum.

On this peninsula a villa was built by Caius Marius,
 with a degree of elegance that gave great offence to
 the more austere among the Romans, who thought

Misdemea-
 nour
 Misenum.

Miser.

it ill suited to the character of so rough a soldier. Upon the same foundation Lucullus, the plunderer of the eastern world, erected an edifice, in comparison of which the former house was a cottage; but even his magnificence was eclipsed by the splendour of the palace which the emperors raised upon the same spot. To these proud abodes of heroes and monarchs, which have long been levelled to the ground, a few fishing huts, as Mr Swinburn informs us, and a lonely public house, have succeeded; hither boatmen resort to tippie, perhaps on the identical site where the voluptuous masters of the world quaffed Chian and Falernian wines.

MISER, a parsimonious person who is at the same time rich; or a wretch covetous to extremity, whom avarice has divested of all the charities of human nature, and made even an enemy to himself.

Of this most unaccountable of all characters, many instances occur; some of them so extraordinary as almost to surpass belief. The following are here selected, as being of recent date, perfectly authentic, and the last of them in particular exhibiting an assemblage of qualities the most singular perhaps that ever centered in the same person. Too little dignified to merit a place in regular biography, yet too curious a variety of human character to pass unnoticed in this Work, the present seemed the only title under which it could with propriety be introduced.

1. In December 1790, died at Paris, literally of want, Mr Ostervald, a well-known banker. This man, originally of Neufchatel, felt the violence of the disease of avarice (for surely it is rather a disease than a passion of the mind) so strongly, that, within a few days of his death, no importunities could induce him to buy a few pounds of meat for the purpose of making a little soup for him. "'Tis true (said he), I should not dislike the soup, but I have no appetite for the meat; what then is to become of that?" At the time that he refused this nourishment, for fear of being obliged to give away two or three pounds of meat, there was tied round his neck a filken bag, which contained 800 assignats of 1000 livres each. At his outset in life, he drank a pint of beer, which served him for supper, every night at a house much frequented, from which he carried home all the bottle-corks he could come at. Of these, in the course of eight years, he had collected as many as sold for 12 louis-d'or, a sum that laid the foundation of his future fortune, the superstructure of which was rapidly raised by his uncommon success in stock jobbing. He died possessed of three millions of livres (L. 125,000 sterling).

2. The late John Elwes, Esq; was member for Berkshire in three successive parliaments. His family name was *Meggot*; and his father was a brewer of great eminence, and distinguished by no peculiarity of character: but his mother, though she was left nearly L. 100,000 by her husband, starved herself to death! At an early period of life he was sent to Westminster school, where he remained for 10 or 12 years. During that time he certainly had not misapplied his talents; for he was a good classical scholar to the last: and it is a circumstance not a little remarkable, though well authenticated, that he never read afterwards, nor had he ever any knowledge in accounts; to which may in some measure be attributed the total ignorance

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he was always in as to his affairs. From Westminster school Mr Meggot removed to Geneva, where he soon entered upon pursuits more agreeable to him than study. The riding-master of the academy there had then to boast perhaps of three of the best riders in Europe, Mr Worsley, Mr Elwes, and Sir Sydney Meadows. Of the three, Elwes was reckoned the most desperate; the young horses were always put into his hands, and he was the rough-rider to the other two.

On his return to England, after an absence of two or three years, he was to be introduced to his uncle the late Sir Harvey Elwes, who was then living at Stoke in Suffolk, perhaps the most perfect picture of human penury that ever existed. The attempts at saving money were in him so extraordinary, that Mr Elwes perhaps never quite reached them, even at the last period of his life.—Of what temperance can do, Sir Harvey was an instance. At an early period of life he was given over for a consumption, and he lived till betwixt 80 and 90 years of age. On his death, his fortune, which was at least L. 250,000, fell to his nephew Mr Meggot, who by will was ordered to assume the name and arms of Elwes. To this uncle, and this property, Mr Elwes succeeded when he had advanced beyond the 40th year of his age. And for 15 years previous to this period, it was that he was known in the more fashionable circles of London. He had always a turn for play; and it was only late in life, and from paying always and not always being paid, that he conceived disgust at it. The theory which he professed, "that it was impossible to ask a gentleman for money," he perfectly confirmed by the practice; and he never violated this feeling to the latest hour of his life.

The manners of Mr Elwes were such—so gentle, so attentive, so gentlemanly, and so engaging—that rudeness could not ruffle them, nor strong ingratitude break their observance. He retained this peculiar feature of the old court to the last: but he had a praise beyond this; he had the most gallant disregard of his own person, and all care about himself, that can be imagined. The instances in younger life, in the most imminent personal hazard, are innumerable; but when age had despoiled him of his activity, and might have rendered care and attention about himself natural, he knew not what they were: He wished no one to assist him: "He was as young as ever; he could walk; he could ride, and he could dance; and he hoped he should not give trouble even when he was old:" He was at that time 75.

It is curious to remark how he contrived to mingle small attempts at saving with objects of the most unbounded dissipation. After sitting up a whole night at play for thousands with the most fashionable and profligate men of the time, amidst splendid rooms, gilt sofas, wax lights, and waiters attendant on his call, he would walk out about four in the morning, not towards home, but into Smithfield, to meet his own cattle, which were coming to market from Thaydon-hall, a farm of his in Essex! There would this same man, forgetful of the scenes he had just left, stand in the cold or rain bartering with a carcass-butcher for a shilling! Sometimes, when the cattle did not arrive at the hour he expected, he would walk on in the mire to meet them; and more than once has gone on foot the whole

Miser.

Miser. whole way to his farm without stopping, which was 17 miles from London, after sitting up the whole night. Had every man been of the mind of Mr Elwes, the race of innkeepers must have perished, and post-chaises have been returned back to those who made them; for it was the business of his life to avoid both. He always travelled on horseback. To see him setting out on a journey, was a matter truly curious; his first care was to put two or three eggs, boiled hard, into his great-coat pocket, or any scraps of bread which he found; baggage he never took: then mounting one of his hunters, his next attention was to get out of London into that road where turnpikes were the fewest: then, stopping under any hedge where grafs presented itself for his horse, and a little water for himself, he would sit down and refresh himself and his horse together.

The chief residence of Mr Elwes at this period of his life was in Berkshire, at his own seat at Marcham. Here it was he had two natural sons born, who inherit the greatest part of his property by a will made about the year 1785. The keeping fox-hounds was the only instance in the whole life of Mr Elwes of his ever sacrificing money to pleasure; and may be selected as the only period when he forgot the cares, the perplexities, and the regret, which his wealth occasioned. But even here every thing was done in the most frugal manner. Scrub, in the *Beaux Stratagem*, when compared with Mr Elwes's huntsman, had an idle life of it. This famous huntsman might have fixed an epoch in the history of servants: for in a morning, getting up at four o'clock, he milked the cows; he then prepared breakfast for Mr Elwes or any friends he might have with him; then slipping on a green coat, he hurried into the stable, saddled the horses, got the hounds out of the kennel, and away they went into the field. After the fatigues of hunting, he refreshed himself by rubbing down two or three horses as quickly as he could; then running into the house to lay the cloth, and wait at dinner; then hurrying again into the stable to feed the horses—diversified with an interlude of the cows again to milk, the dogs to feed, and eight hunters to litter down for the night.

In the penury of Mr Elwes there was something that seemed like a judgment from heaven. All earthly comforts he voluntarily denied himself: he would walk home in the rain in London rather than pay a shilling for a coach; he would sit in wet cloaths sooner than have a fire to dry them; he would eat his provisions in the last stage of putrefaction sooner than have a fresh joint from the butchers; and he wore a wig for above a fortnight, which his biographer* saw him pick up out of a rut in a lane where they were riding. This was the last extremity of laudable economy; for to all appearance it was the cast-off wig of some beggar!

Mr Elwes had now resided about 13 years in Suffolk, when the contest for Berkshire presented itself on the dissolution of the parliament; and when, to preserve the peace of that county, he was nominated by Lord Craven. Mr Elwes, though he had retired from public business for some years, had still left about him some of the seeds of more active life, and he agreed to the proposal. It came farther enhanced to him, by the agreement, that he was to be brought in by the

freeholders for nothing. All he did on the occasion was dining at the ordinary at Reading; and he got into parliament for 18 pence!

Though a new man, Mr Elwes could not be called a young member; for he was at this time nearly 60 years old when he thus entered on public life. But he was in possession of all his activity; and, preparatory to his appearance on the boards of St Stephen's Chapel, he used to attend constantly during the races and other public meetings all the great towns where his voters resided. At the different assemblies, he would dance amongst the youngest to the last, after riding over on horseback, and frequently in the rain, to the place of meeting. A gentleman who was one night standing by, observed on the extraordinary agility of so old a man.—“O! that is nothing (replied another); for Mr Elwes, to do this, rode 20 miles in the rain, with his shoes stuck into his boots and his bag-wig in his pocket.”

The honour of parliament made no alteration in the dress of Mr Elwes: on the contrary, it seemed at this time to have attained additional meanness; and nearly to have reached that happy climax of poverty, which has more than once drawn on him the compassion of those who passed by him in the street. For the speaker's dinners, however, he had one suit, with which the speaker in the course of the sessions became very familiar. The minister likewise was well acquainted with it; and at any dinner of opposition still was his apparel the same. The wits of the minority used to say, “that they had full as much reason as the minister to be satisfied with Mr Elwes, as he had the same habit with every body.” At this period of his life Mr Elwes wore a wig. Much about the time when his parliamentary life ceased, that wig was worn out; so then, being older and wiser as to expence, he wore his own hair, which like his expences was very small.

All this time the income of Mr Elwes was increasing hourly, and his present expenditure was next to nothing; for the little pleasures he had once engaged in he had now given up. He kept no house, and only one old servant and a couple of horses: he resided with his nephew: his two sons he had stationed in Suffolk and Berkshire, to look after his respective estates: and his dress certainly was no expence to him; for had not other people been more careful than himself, he would not have had it even mended.

When he left London, he went on horseback to his country-seats with his couple of hard eggs, and without once stopping upon the road at any house. He always took the most unfrequented road, and used every shift to avoid turnpikes. Marcham was the seat he now chiefly visited; which had some reason to be flattered with the preference, as his journey into Suffolk cost him only two-pence halfpenny, while that into Berkshire amounted to four-pence!

As Mr Elwes came into parliament without expence, he performed his duty as a member would have done in the pure days of our constitution. What he had not bought, he never attempted to sell; and he went forward in that straight and direct path, which can alone satisfy a reflecting mind. Amongst the smaller memorials of the parliamentary life of Mr Elwes may be noted, that he did not follow the cu-

* Mr Topham; from whose *Life of John Elwes, Esq;* the particulars of this article are extracted.

Miser. from of members in general, by sitting on any particular side of the house, but sat as occasion presented itself on either indiscriminately; and he voted much in the same manner, but never rose to speak. In his attendance at the house, he was always early and late; and he never left it for dinner, as he had accustomed himself to fasting, sometimes for 24 hours in continuance.

When he quitted parliament, he was, in the common phrase, "a fish out of water!" The style of Mr Elwes's life had left him no domestic scenes to which he could retire—his home was dreary and poor—his rooms received no cheerfulness from fire; and while the outside had all the appearance of a "House to be Let," the inside was a desert; but he had his penury alone to thank for this, and for the want of all the little consolations which should attend old age, and smooth the passage of declining life. At the close of the spring of 1785, he wished again to visit, which he had not done for some years, his seat at Stoke. But then the journey was a most serious object to him. The famous old servant was dead; all the horses that remained with him were a couple of worn-out brood-mares; and he himself was not in that vigour of body in which he could ride 60 or 70 miles on the sustenance of *two boiled eggs*. The mention of a post-chaise would have been a crime—"He afford a post-chaise, indeed! where was he to get the money?" would have been his exclamation. At length he was carried into the country as he was carried into parliament, free of expence, by a gentleman who was certainly not quite so rich as Mr Elwes. When he reached Stoke—the seat of more active scenes, of somewhat resembling hospitality, and where his fox-hounds had spread somewhat like vivacity around—he remarked, "he had expended a great deal of money once very foolishly; but that a man grew wiser by time."

The rooms at this seat, which were now much out of repair, and would have all fallen in but for his son John Elwes, Esq; who had resided there, he thought too expensively furnished, as worse things might have served. If a window was broken, there was to be no repair but that of a little brown paper, or that of piecing in a bit of broken glass; which had at length been done so frequently, and in so many shapes, that it would have puzzled a mathematician to say "what figure they described." To save fire, he would walk about the remains of an old greenhouse, or sit with a servant in the kitchen. During the harvest he would amuse himself with going into the fields to glean the corn on the grounds of his own tenants; and they used to leave a little more than common to please the old gentleman, who was as eager after it as any pauper in the parish. In the advance of the season, his morning employment was to pick up any stray chips, bones, or other things, to carry to the fire, in his pocket—and he was one day surprised by a neighbouring gentleman in the act of pulling down, with some difficulty, a crow's nest for this purpose. On the gentleman wondering why he gave himself this trouble—"Oh, Sir, (replied old Elwes), it is really a shame that these creatures should do so. Do but see what waste they make! They don't care how extravagant they are!"

As no gleam of favourite passion, or any ray of amusement, broke through this gloom of penury, his

insatiable desire of saving was now become uniform and systematic. He used still to ride about the country on one of these mares—but then he rode her very economically, on the soft turf, adjoining the road, without putting himself to the expence of shoes, as he observed, "The turf was so pleasant to a horse's foot!" And when any gentleman called to pay him a visit, and the boy who attended in the stables was profuse enough to put a little hay before his horse, old Elwes would slyly steal back into the stable, and take the hay very carefully away. That very strong appetite which Mr Elwes had in some measure restrained during the long sitting of parliament, he now indulged most voraciously, and on every thing he could find. To save, as he thought, the expence of going to a butcher, he would have a whole sheep killed, and so eat mutton to the—*end of the chapter*. When he occasionally had his river drawn, though sometimes horse-loads of small fish were taken, not one would he suffer to be thrown in again; for he observed, "He should never see them again!" Game in the last state of putrefaction, and meat that *walked about his plate*, would he continue to eat, rather than have new things killed before the old provision was finished. With this diet—the *charnel-house of sustenance*—his dress kept pace—equally in the last stage of *absolute dissolution*. Sometimes he would walk about in a tattered brown-coloured hat, and sometimes in a red and white woollen cap, like a prisoner confined for debt. His shoes he never would suffer to be cleaned, lest they should be worn out the sooner. But still, with all this *self-denial*—that penury of life to which the inhabitant of an *alms-house* is not doomed—still did he think he was profuse, and frequently say, "He must be a little more careful of his property." His disquietude on the subject of money was now continual. When he went to bed, he would put five or ten guineas into a bureau; and then, full of his money, after he had retired to rest, and sometimes in the middle of the night, he would come down to see if it was there.

The scene of mortification at which Mr Elwes was now arrived was all but a denial of the common necessities of life: and indeed it might have admitted a doubt, whether or not, if his manors, his fish-ponds, and some grounds in his own hands, had not furnished a subsistence, where he had not any thing *actually to buy*, he would not, rather than have *bought any thing*, have starved. Strange as this may appear, it is not exaggerated.—He one day, during this period, dined upon the remaining part of a moor-hen, which had been brought out of the river by a *rat*! and at another eat an undigested part of a pike which a larger one had swallowed, but had not finished, and which were taken in this state in a net. At the time this last circumstance happened, he discovered a strange kind of satisfaction; for he said to a friend, "Aye! this was killing two birds with one stone!" In the room of all comment—of all moral—let it be remarked, that at this time Mr Elwes was perhaps worth nearly *eight hundred thousand pounds*! and, at this period, he had not made his will, of course was not saving from any sentiment of affection for any person.

The summer of 1788 Mr Elwes passed at his house in Welbeck-street, London; and he passed that summer without any other society than that of two maid-servants;

Miser. servants; for he had now given up the expence of keeping any male domestic. His chief employment used to be that of getting up early in a morning to visit some of his houses in Mary-le-Bone, which during the summer were repairing. As he was there generally at four o'clock in a morning, he was of course on the spot before the workmen; and he used contentedly to sit down on the steps before the door, to scold them when they did come. The neighbours who used to see him appear thus regular every morning, and who concluded, from his apparel, he was one of the workmen, observed, "there never was so punctual a man as the old carpenter." During the whole morning he would continue to run up and down stairs to see the men were not idle for an instant, with the same anxiety as if his whole happiness in life had been centered in the finishing this house, regardless of the greater property he had at stake in various places, and for ever employed in the minutiae only of affairs. Indeed such was his anxiety about this house, the rent of which was not above L. 50 a-year, that it brought on a fever which nearly cost him his life: but the fate which dragged him on thus strangely to bury him under the load of his own wealth, seemed as resistless as it was unaccountable.

In the muscular and unencumbered frame of Mr Elwes there was every thing that promised extreme length of life; and he lived to above 70 years of age without any natural disorder attacking him: but, as Lord Bacon has well observed, "the minds of some men are a lamp that is continually burning;" and such was the mind of Mr Elwes. Removed from those occasional public avocations which had once engaged his attention, money was now his only thought. He rose upon money—upon money he lay down to rest; and as his capacity sunk away from him by degrees, he dwindled from the real cares of his property into the puerile concealment of a few guineas. This little store he would carefully wrap up in various papers, and depositing them in different corners, would amuse himself with running from one to the other, to see whether they were all safe. Then forgetting, perhaps, where he had concealed some of them, he would become as seriously afflicted as a man might be who had lost all his property. Nor was the day alone thus spent—he would frequently rise in the middle of the night, and be heard walking about different parts of the house, looking after what he had thus hidden and forgotten.

During the winter of 1789, the last winter Mr Elwes was fated to see, his memory visibly weakened every day; and from the unceasing wish to save money he now began to fear he should die in want of it. Mr Gibson had been appointed his builder in the room of Mr Adams; and one day, when this gentleman waited upon him, he said with apparent concern, "Sir, pray consider in what a wretched state I am; you see in what a good house I am living; and here are five guineas, which is all I have at present; and how I shall go on with such a sum of money puzzles me to death. I dare say you thought I was rich; now you see how it is!"

Mr George Elwes having now settled at his seat at Marcham in Berkshire, he was naturally desirous that, in the affluities of his wife, his father might at length

find a comfortable home. In London he was certainly most uncomfortable: but still, with these temptations before and behind him, a journey with any expence annexed to it was insurmountable. This, however, was luckily obviated by an offer from Mr Partis, a gentleman of the law, to take him to his ancient seat in Berkshire with his purse perfectly whole. But there was one circumstance still very distressing—the old gentleman had now nearly worn out his last coat, and he would not buy a new one; his son, therefore, with a pious fraud, contrived to get Mr Partis to buy him a coat and make him a present of it. Thus, formerly having had a good coat, then a bad one, and at last no coat at all, he was kind enough to accept one from a neighbour.

Mr Elwes carried with him into Berkshire five guineas and a half, and half a crown. Left the mention of this sum may appear singular, it should be said, that previous to his journey he had carefully wrapped it up in various folds of paper, that no part of it might be lost. On the arrival of the old gentleman, Mr George Elwes and his wife did every thing they could to make the country a scene of quiet to him. But "he had that within" which baffled every effort of this kind. Of his heart it might be said, "there was no peace in Israel." His mind, cast away upon the vast and troubled ocean of his property extending beyond the bounds of his calculation, returned to amuse itself with fetching and carrying about a few guineas, which in that ocean was indeed a drop. But nature had now carried on life nearly as far as she was able, and the sand was almost run out. The first symptoms of more immediate decay was his inability to enjoy his rest at night. Frequently would he be heard at midnight as if struggling with some one in his chamber, and crying out, "I will keep my money, I will; nobody shall rob me of my property." On any one of the family going into his room, he would start from this fever of anxiety, and, as if waking from a troubled dream, again hurry into bed, and seem unconscious of what had happened. At length, on the 26th November 1789, expired this miserably rich man, whose property, nearly reaching to a million, extended itself almost through every county in England.

MISERICORDIA, in law, is an arbitrary fine imposed on any person for an offence: this is called *miseriordia*, because the amercement ought to be but small, and less than that required by magna charta. If a person be outrageously amerced in a court that is not of record, the writ called *moderata miseriordia* lies for moderating the amercement according to the nature of the fault.

MISFORTUNE. An unlucky accident.

MISFORTUNE, or chance, in law, a deficiency of the will; or committing of an unlawful act by misfortune or chance, and not by design. In such case, the will observes a total neutrality, and does not co-operate with the deed; which therefore wants one main ingredient of a crime. See **CRIME**.

Of this, when it affects the life of another, we have spoken under the article **HOMICIDE**; and in this place have only occasion to observe, that if any accidental mischief happens to follow from the performance of a lawful act, the party stands excused from all guilt:

Misfeasance
||
Misprisions

but if a man be doing any thing unlawful, and a consequence ensues which he did not foresee or intend, as the death of a man or the like, his want of foresight shall be no excuse; for, being guilty of one offence, in doing antecedently what is in itself unlawful, he is criminally guilty of whatever consequence may follow the first misbehaviour.

MISFEASANCE, in law-books, signifies a trespass.

MISLETOE, in botany. See VISCUM.

MISNOMER, in law, a misnaming or mistaking a person's name. The Christian name of a person should always be perfect; but the law is not so strict in regard to surnames, a small mistake in which will be dispensed with to make good a contract, and support the act of the party. See PLEA to Indictment.

MISPRISIONS, (a term derived from the old French, *mespris*, a neglect or contempt), are, in the acceptation of our law, generally understood to be all such high offences as are under the degree of capital, but nearly bordering thereon: and it is said, that a misprision is contained in every treason and felony whatsoever; and that, if the king so please, the offender may be proceeded against for the misprision only. And upon the same principle, while the jurisdiction of the star-chamber subsisted, it was held that the king might remit a prosecution for treason, and cause the delinquent to be censured in that court, merely for a high misdemeanour: as happened in the case of Roger earl of Rutland, in 43 Eliz. who was concerned in the earl of Essex's rebellion. Misprisions are generally divided into two sorts; negative, which consist in the concealment of something which ought to be revealed; and positive, which consist in the commission of something which ought not to be done.

1. Of the first, or negative kind, is what is called *misprision of treason*; consisting in the bare knowledge and concealment of treason, without any degree of assent thereto: for any assent makes the party a principal traitor; as indeed the concealment, which was construed aiding and abetting, did at the common law; in like manner as the knowledge of a plot against the state, and not revealing it, was a capital crime at Florence, and other states of Italy. But it is now enacted by the statute 1 & 2 Ph. & Mar. c. 10. that a bare concealment of treason shall be only held a misprision. This concealment becomes criminal, if the party apprised of the treason does not, as soon as conveniently may be, reveal it to some judge of assize or justice of the peace. But if there be any probable circumstances of assent, as if one goes to a treasonable meeting, knowing beforehand that a conspiracy is intended against the king; or, being in such company once by accident, and having heard such treasonable conspiracy, meets the same company again, and hears more of it, but conceals it; this is an implied assent in law, and makes the concealer guilty of actual high-treason.

Misprision of felony is also the concealment of a felony which a man knows, but never assented to; for, if he assented, this makes him either principal or accessory. And the punishment of this, in a public officer, by the statute Westm. 1. 3 Edw. I. c. 9. is imprisonment for a year and a day; in a common person, imprisonment for a less discretionary time; and,

in both, fine and ransom at the king's pleasure: which pleasure of the king must be observed, once for all, not to signify any extrajudicial will of the sovereign, but such as is declared by his representatives, the judges in his courts of justice; *voluntas regis in curia, non in comera.*

2. Misprisions, which are merely positive, are generally denominated *contempt* or *high misdemeanours*; of which the principal is the *mal-administration* of such high officers as are in public trust and employment. This is usually punished by the method of parliamentary impeachment; wherein such penalties, short of death, are inflicted, as to the wisdom of the house of peers shall seem proper; consisting usually of banishment, imprisonment, fines, or perpetual disability. Hither also may be referred the offence of *embezzling the public money*, called among the Romans *peculatus*; which the Julian law punished with death in a magistrate, and with deportation, or banishment, in a private person. With us it is not a capital crime, but subjects the committer of it to a discretionary fine and imprisonment.—Other misprisions are, in general, such contempts of the executive magistrate as demonstrate themselves by some arrogant and undutiful behaviour towards the king and government: for a detail of which, *vide* Blackstone's Comment. iv. 22.

MISSAL, the Romish mass-book, containing the several masses to be said on particular days. It is derived from the Latin word *missa*, which, in the ancient Christian church, signified every part of divine service.

MISSEL-BIRD, a species of TURDUS.

MISSIO, among the Romans, was a full discharge given to a soldier after 20 years service, and differed from the *exauctoratio*, which was a discharge from duty after 17 years service. Every soldier had a right to claim his *missio* at the end of 20 years.

MISSION, in theology, denotes a power or commission to preach the gospel. Jesus Christ gave his disciples their mission in these words, *Go and teach all nations, &c.*

The Romanists reproach the Protestants, that their ministers have no mission, as not being authorised in the exercise of their ministry, either by an uninterrupted succession from the apostles, or by miracles, or by any extraordinary proof of a vocation.

Many among us deny any other mission necessary for the ministry than the talents necessary to discharge it.

MISSION is also used for an establishment of people zealous for the glory of God and the salvation of souls; who go and preach the gospel in remote countries and among infidels.

There are missions in the East as well as in the West Indies. Among the Romanists, the religious orders of St Dominic, St Francis, St Augustine, and the Jesuits, have missions in the Levant, America, &c. The Jesuits have also missions in China, and all other parts of the globe where they have been able to penetrate. There have been also several Protestant missions for diffusing the light of Christianity through the benighted regions of Asia and America. Of this kind has been the Danish mission planned by Frederic IV. in 1706. And the liberality of private benefactors in our own country has been also extended

Misprisions
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Mission.

Missionary to the support of missionaries among the Indians in America, &c.

Mitchels-town.

MISSIONARY, an ecclesiastic who devotes himself and his labours to some mission, either for the instruction of the orthodox, the conviction of heretics, or the conversion of infidels. See **JESUITS**.

MISSISSIPPI, also called the *river of St Louis*, in North America, is one of the largest in the world. Its source is unknown. It passes south through Louisiana, and runs above 2000 miles, till it falls into the gulph of Florida. Like the Nile, it has periodical inundations, by the melting of snow in the north, so that in May it overflows the country on each side, from 60 to 90 miles, and the inundation continues till near the end of July. In the lowest parts of the country there are morasses, lakes, and canals, along the banks, which are generally covered with trees, and in some places the course of the river is confined between high precipices. Its inundations always leave a great quantity of mud upon the land, and sometimes carry down trees to the river's mouth, where they form new islands, and render the entrance difficult.

MISSION (Francis Maximilian), whose pleadings before the parliament of Paris in favour of the reformers bear genuine marks of eloquence and ability, retired into England after the revocation of the edict of Nantz, and became a strenuous assertor of the Protestant religion. In the years 1687 and 1688 he travelled to Italy as governor to an English nobleman: in consequence of which he published at the Hague, "A new voyage to Italy," 3 vols 12mo; which has been translated into English with many additions. He published also the "Sacred Theatre at Cevennes, or an account of Prophecies and Miracles performed in that part of Languedoc," London 1707. "Observations and Remarks of a Traveller," 12mo, Hague. He died at London in 1721.

MISSUS, in the Circensian games, were the matches in horse or chariot races. The usual number of *missus* or matches in one day was 24; though the emperor Domitian presented the people with 100. The last match was generally made at the expence of the people, who made a collection for the purpose; hence it was called *missus ararius*, a subscription plate.

MIST, or **FOG**. See **FOG**.

MISTAKE, any wrong action committed, not thro' an evil design, but through an error of judgement.

MISTAKE, in **LAW**. See **IGNORANCE**.

MISUSER, in law, is an abuse of any liberty or benefit; as "He shall make fine for his **MISUSER**." Old. Nat. Br. 149. By misuser a charter of a corporation may be forfeited; so also an office, &c.

MISY, in natural history, a species of the chalcantia, a fossil very common in the Turkish dominions, and sometimes found in the mines of Kremnitz in Hungary. It is a considerably firm substance, of an irregular texture, not compact; much resembling some of our more gaudy marcasites, but wanting in their hardness and weight. It is of no determinate shape or size; but is often found in small detached masses, which are usually broad, flat, and very rugged at the edges. As to its medical virtues, they are no other than those of the green vitriol.

MITCHELSTOWN, a post-town of Ireland, in the county of Cork, and province of Munster in Ire-

land, 102 miles from Dublin. Here is a college for the support of 12 decayed gentlemen and 12 decayed gentlewomen, who have L. 40 yearly, and handsome apartments, and a chaplain at L. 100 a-year, with a house: divine service is daily performed in a neat chapel belonging to the college: the whole was founded by the late earl of Kingston. Here is also a most magnificent seat of Lord Kingsborough.—Fairs are held at this town 30th July and 12th November.

MITE, a small piece of money mentioned Luke xii. 59. and xxi. 2. In the Greek it is *χόδραίνος*, i. e. *quadrans*, or a quarter of the Roman *denarius*; so that the mite was worth about seven farthings, or two-pence of our money.

MITE, in zoology. See **ACARUS**.

MITELLA, **BASTARD AMERICAN SANICLE**: A genus of the digynia order, belonging to the decandria class of plants; and in the natural method ranking under the 13th order, *Succulentæ*. The calyx is quinquefid; the corolla pentapetalous, and inserted into the calyx; the petals pinnatifid; the capsule unilocular and bivalved, with the valves equal. There are two species, both natives of North America, rising with annual herbaceous stalks from five or six to eight or nine inches in height, and producing spikes of small whitish flowers, whose petals are fringed on their edges. They are easily propagated by parting their roots; and should be planted in a shady situation, and in a soft loamy soil.

MITHRA, feasts of, in antiquity, were feasts celebrated among the Romans in honour of Mithras or the sun. The most ancient instance of this Mithras among the Romans occurs in an inscription dated in the third consulate of Trajan, or about the year of Christ 101. This is the dedication of an altar to the sun under the above name, thus inscribed, *Deo Soli Mithrae*. But the worship of Mithras was not known in Egypt and Syria in the time of Origen, who died about the year of Christ 263; though it was common at Rome for more than a century before this time. The worship of Mithras was proscribed at Rome in the year 378, by order of Gracchus, prefect of the prætorium. According to M. Freret, the feasts of Mithras were derived from Chaldæa, where they had been instituted for celebrating the entrance of the sun into the sign Taurus.

MITHRAS, or **MITHRA**, a god of Persia and Chaldæa, supposed to be the sun. His worship was introduced at Rome. He is generally represented as a young man, whose head is covered with a turban after the manner of the Persians. He supports his knee upon a bull that lies on the ground, and one of whose horns he holds in one hand, while with the other he plunges a dagger in his neck.

MITHRIDATE, in pharmacy; an antidote, or composition, in form of an electuary, supposed to serve either as a remedy or a preservative against poisons. (See **PHARMACY**). It takes its name from the inventor, Mithridates king of Pontus; who is said to have so fortified his body against poisons with antidotes and preservatives, that when he had a mind to dispatch himself, he could not find any poison that would take effect. The receipt of it was found in his cabinet, written with his own hand, and was carried to Rome by Pompey. It was translated into

Mite

Mithridate

Mithri-
dates.

verse by Damocrates, a famous physician; and was afterwards translated by Galen, from whom we have it: though there is room to imagine it has undergone considerable alterations since the time of its royal prescriber.

MITHRIDATES, the name of several kings of Pontus. See PONTUS.

MITHRIDATES VII. surnamed *Eupator* and *the Great*, succeeded to the throne at the age of 11 years, about 123 years before the Christian era. The beginning of his reign was marked by ambition, cruelty, and artifice. He murdered his own mother, who had been left by his father coheirs of the kingdom; and he fortified his constitution by drinking antidotes against the poison with which his enemies at court attempted to destroy him. He early inured his body to hardship, and employed himself in the most manly exercises, often remaining whole months in the country, and making frozen snow and the earth the place of his repose. Naturally ambitious and cruel, he spared no pains to acquire himself power and dominion. He murdered the two sons whom his sister Laodice had had by Ariarathes king of Cappadocia, and placed one of his own children, only eight years old, on the vacant throne. These violent proceedings alarmed Nicomedes king of Bithynia, who had married Laodice the widow of Ariarathes. He suborned a youth to be king of Cappadocia, as the third son of Ariarathes; and Laodice was sent to Rome to impose upon the senate, and assure them that her third son was now alive, and that his pretensions to the kingdom of Cappadocia were just and well grounded. Mithridates, on his part, sent to Rome Gordius the governor of his son; who solemnly declared before the Roman people, that the youth who sat on the throne of Cappadocia was the third son and lawful heir of Ariarathes, and that he was supported as such by Mithridates. This intricate affair displeased the Roman senate; and finally to settle the dispute they took away the kingdom of Cappadocia from Mithridates, and Paphlagonia from Nicomedes. These two kingdoms being thus separated from their original possessors, were presented with their freedom and independence: but the Cappadocians refused it, and received Ariobarzanes for king. Such were the first seeds of enmity between Rome and the king of Pontus. Mithridates never lost an opportunity by which he might lessen the influence of his adversaries; and the more effectually to destroy their power in Asia, he ordered all the Romans that were in his dominions to be massacred. This was done in one night, and no less than 150,000, according to Plutarch, or 80,000 Romans, as Appian mentions, were made the victims of his cruelty. This called aloud for vengeance. Aquilius, and soon after Sylla, marched against Mithridates with a large army. The former was made prisoner; but Sylla obtained a victory over the king's generals; and another decisive engagement rendered him master of all Greece, Macedonia, Ionia, and Asia Minor. This ill fortune was aggravated by the loss of about 200,000 men, who were killed in the several engagements that had been fought; and Mithridates, weakened by repeated ill success by sea and land, sued for peace from the conqueror, which he obtained on condition of defraying the expences which the Romans had incurred by the war, and of

Mithri-
dates.

remaining satisfied with the possessions which he had received from his ancestors. While these negotiations of peace were carried on, Mithridates was not unmindful of his real interest. His poverty, and not his inclinations, obliged him to wish for peace. He immediately took the field with an army of 140,000 infantry and 16,000 horses, which consisted of his own forces and those of his son-in-law Tigranes king of Armenia. With such a numerous army, he soon made himself master of the Roman provinces in Asia; none dared to oppose his conquests; and the Romans, relying on his fidelity, had withdrawn the greatest part of their armies from the country. The news of his warlike preparations was no sooner heard, than Lucullus the consul marched into Asia; and without delay he blocked up the camp of Mithridates, who was then besieging Cyzicus. The Asiatic monarch escaped from him, and fled into the heart of his kingdom. Lucullus pursued him with the utmost celerity; and would have taken him prisoner after a battle, had not the avidity of his soldiers preferred the plundering of a mule loaded with gold to the taking of a monarch who had exercised such cruelties against their countrymen, and shown himself so faithless to the most solemn engagements. After this escape Mithridates was more careful about the safety of his person; and he even ordered his wives and sisters to destroy themselves, fearful of their falling into the enemy's hands. The appointment of Glabrio to the command of the Roman forces, instead of Lucullus, was favourable to Mithridates, who recovered the greatest part of his dominions. The sudden arrival of Pompey, however, soon put an end to his victories. A battle in the night was fought near the Euphrates, in which the troops of Pontus laboured under every disadvantage. The engagement was by moon-light, and as the moon then shone in the face of the enemy, the lengthened shadows of the arms of the Romans having induced Mithridates to believe that the two armies were close together, the arrows of his soldiers were darted from a great distance, and their efforts rendered ineffectual. An universal overthrow ensued, and Mithridates, bold in his misfortunes, rushed through the thick ranks of the enemy at the head of 800 horsemen, 500 of whom perished in the attempt to follow him. He fled to Tigranes; but that monarch refused an asylum to his father-in-law, whom he had before supported with all the collected forces of his kingdom. Mithridates found a safe retreat among the Scythians; and though destitute of power, friends, and resources, yet he meditated the overthrow of the Roman empire, by penetrating into the heart of Italy by land. These wild projects were rejected by his followers, and he sued for peace. It was denied to his ambassadors; and the victorious Pompey declared, that, to obtain it, Mithridates must ask it in person. He scorned to trust himself in the hands of his enemy, and resolved to conquer or to die. His subjects refused to follow him any longer; and revolting from him, made his son Pharnaces king. The son showed himself ungrateful to his father; and even, according to some writers, he ordered him to be put to death. This unnatural treatment broke the heart of Mithridates; he obliged his wife to poison herself, and attempted to do the same himself. It was in vain: the frequent antidotes he had taken in
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the early part of his life, strengthened his constitution against the poison; and when this was unavailing, he attempted to stab himself. The blow was not mortal; and a Gaul who was then present, at his own request gave him the fatal stroke, about 64 years before the Christian era. Such were the misfortunes, abilities, and miserable end, of a man, who supported himself so long against the power of Rome, and who, according to the declarations of the Roman authors, proved a more powerful and indefatigable adversary to the capital of Italy than the great Annibal, Pyrrhus, Perseus, or Antiochus. Mithridates has been commended for his eminent virtues, and censured for his vices. As a commander, he deserves the most unbounded applause; and it may create admiration to see him waging war, with such success, during so many years, against the most powerful people on earth, led to the field by a Sylla, a Lucullus, and a Pompey. He was the greatest monarch that ever sat on a throne, according to the opinion of Cicero; and indeed no greater proof of his military character can be brought, than the mention of the great rejoicings which happened in the Roman armies and in the capital at the news of his death. No less than 12 weeks were appointed for public thank-givings to the immortal gods; and Pompey, who had sent the first intelligence of his death to Rome, and who had partly hastened his fall, was rewarded with the most uncommon honours. It is said that Mithridates conquered 24 nations, whose different languages he knew, and spoke with the same ease and fluency as his own. As a man of letters he also deserves attention. He was acquainted with the Greek language, and even wrote in that dialect a treatise on botany. His skill in physic is well known; and even now there is a celebrated antidote which bears his name, and is called *mithridate*. Superstition as well as nature had united to render him great; and if we rely upon the authority of Justin, his birth was accompanied by the appearance of two large comets, which were seen for 70 days successively, and whose splendor eclipsed the mid-day sun, and covered the fourth part of the heavens.

MITHRIDATICUM BELLUM, the *Mithridatic War*, one of the longest and most celebrated wars ever carried on by the Romans against a foreign power. See **PONTUS**.

MITRA, was a cap or covering for the head, worn by the Roman ladies, and sometimes by the men; but it was looked upon as a mark of effeminacy in the last, especially when it was tied upon their heads.

MITRE, a sacerdotal ornament worn on the head, by bishops and certain abbots on solemn occasions; being a sort of cap, pointed and cleft at top. The high-priest among the Jews wore a mitre or bonnet on his head. The inferior priests of the same nation had likewise their mitres; but in what respect they differed from that of the high-priest, is uncertain. Some contend that the ancient bishops wore mitres; but this is by no means certain.

MITRE, in architecture, is the workmens term for an angle that is just 45 degrees, or half a right one. If the angle be a quarter of a right angle, they call it a *half-mitre*.

To describe such angles, they have an instrument called the *mitre-square*; with this they strike mitre-

lines on their quarters or battens; and for dispatch, they have a *mitre-box*, as they call it, which is made of two pieces of wood, each about an inch thick, one nailed upright on the edge of the other; the upper piece hath the mitre-lines struck upon it on both sides, and a kerf to direct the saw in cutting the mitre-joints readily, by only applying the piece into this box.

MITRE is used by the writers of the Irish history for a sort of base money, which was very common there about the year 1270, and for 30 years before and as many after.

There were beside the mitre several other pieces called according to the figures impressed upon them, rosaries, lionades, eagles, and by the like names. They were imported from France and other countries, and were so much below the proper currency of the kingdom, that they were not worth so much as a halfpenny each. They were at length decayed in the year 1300, and good coins struck in their place. These were the first Irish coins in which the sceptre was left out. They were struck in the reign of Edward, the son of our Henry III. and are still found among the other antiquities of that country. They have the king's head in a triangle full-faced. The penny, when well preserved, weighs 22 grains; the halfpenny 10½ grains.

MITTAU, the capital of the duchy of Courland. It is strongly fortified; but was taken by the Swedes in 1701, and by the Muscovites in 1706. E. Long. 23. 51. N. Lat. 56. 44.

MITTIMUS, as generally used, hath two significations. 1. It signifies a writ for removing or transferring of records from one court to another. 2. It signifies a precept, or command in writing, under the hand and seal of a justice of the peace, directed to the gaoler or keeper of some prison, for the receiving and safe keeping of an offender charged with any crime, until he be delivered by due course of law.

MITYLENE, or **MYTELENE** (anc. geog.), a celebrated, powerful, and affluent city, capital of the island of Lesbos. It receives its name from *Mitylene*, the daughter of Macareus, a king of the country. It is greatly commended by the ancients for the stateliness of its buildings and the fruitfulness of its soil, but more particularly for the great men it produced: Pittacus, Alcaeus, Sappho, Terpander, Theophanes, Hellenicus, &c. were all natives of Mitylene. It was long a seat of learning; and with Rhodes and Athens, it had the honour of having educated many of the great men of Rome and Greece. In the Peloponnesian war, the Mityleneans suffered greatly for their revolt from the power of Athens; and in the Mithridatic wars, they had the boldness to resist the Romans, and disdain the treaties which had been made between Mithridates and Sylla. See **METELIN**.

MIXT, or **MIXT BODY**, in chemistry, that which is compounded of different elements or principles.

MIXTURE, a compound or assemblage of several different bodies in the same mass. Simple mixture, consists only in the simple apposition of parts of different bodies to each other. Thus, when powders of different kinds are rubbed together, the mixture is only simple, and each of the powders retains its particular characters. In like manner, when oil and water are mixed together, though the parts of both are confounded, so that the liquor may appear to be homogeneous, we cannot say that there is any more than a simple

Mitre.
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Mixture.

Mixture || **Mnium.** simple apposition of the parts, as the oil and water may very easily be again separated from each other. But the case is very different when bodies are *chemically* mixed; for then one or both bodies assume new properties, and can by no means be discovered in their proper form without a particular chemical process adapted to this purpose. Hence chemical mixture is attended with many phenomena which are never observed in simple mixtures; such as heat, effervescence, &c. To chemical mixture belongs the union of acids and alkalies, the amalgamation of metals, solution of gums, &c. and upon it depend many of the principal operations of CHEMISTRY. See that article *passim*.

MIXTURE, in pharmacy, a medicine which differs from a julep in this respect, that it receives into its composition not only salts, extracts, and other substances dissoluble in water; but also earths, powders, and such substances as cannot be dissolved.

MIZEN, in the sea-language, is a particular mast or sail. The mizen-mast stands in the sternmost part of the ship. In some great ships there are two of these; when that next the main-mast is called the *main-mizen*, and that next the poop the *bonaventure mizen*.

MIZRAIM, or **MISRAIM**, the dual name of Egypt, used in scripture to denote the Higher and Lower Egypt, which see. It sometimes occurs singular, *Mazor*: 2 Kings xix. Isaiah xix. Micah vii.

MNEMOSYNE (fab. hist.), a daughter of Coelus and Terra. She married Jupiter, by whom she had the nine muses. The word *mnemosyne* signifies "memory;" and therefore the poets have rightly called Memory the mother of the muses, because it is to that mental endowment that mankind are indebted for their progress in science.

MNIUM, **MARSHMOSS**; a genus of the natural order of musci, belonging to the cryptogamia class of plants. The anthera is operculated; the calyptra smooth; the female capitulum naked and powdery, remote. There are 18 species, of which seven are natives of Britain; but none have any remarkable property except the two following. 1. The fontanum is an elegant moss, frequent in bogs, and on the borders of cold springs. It is from two to four inches high: the stalks are simple at the base, and covered with a rusty down; but higher up are red, and divided into several round, single, taper branches, which proceed nearly from the same point. The leaves are not more than $\frac{1}{15}$ th of an inch long, lanceolate and acute, of a whitish green colour; and so thinly set, that the red stalk appears between them. This moss, as it may be seen at a considerable distance, is a good mark to lead to the discovery of clear and cold springs. Linnæus informs us, that the Laplanders are well acquainted with this sign. Mr Withering informs us, that wherever this moss grows, a spring of fresh water may be found without much digging. 2. The hygrometricum grows in woods, heaths, garden-walks, walls, old trees, decayed wood, and where coals or cinders have been laid. It is stemless, hath tips inversely egg-shaped, nodding, and bright yellow. If the fruit-stalk is moistened at the base with a little water or steam, the head makes three or four revolutions: if the head is moistened, it turns back again.

Nº 225.

MOAB (anc. geog.), a country of Arabia Petraea; so called from Moab the son of Lot, to whose posterity this country was allotted by divine appointment, Deut. xi. 9. It was originally occupied by the Emim, a race of giants extirpated by the Moabites, *ibid*. Moab anciently lay to the south of Ammon, before Sihon the Amorite stripped both nations of a part of their territory, afterwards occupied by the Israelites, Numb. xxi.; and then Moab was bounded by the river Arnon to the north, the Lacus Asphaltites to the west, the brook Zared to the south, and the mountains Abarim to the east.

MOAT, or **DITCH**, in fortification, a deep trench dug round the rampart of a fortified place, to prevent surprises.

The brink of the moat, next the rampart, is called the *scarpe*; and the opposite one, the *counter-scarpe*.

A dry moat round a large place, with a strong garrison, is preferable to one full of water; because the passage may be disputed inch by inch, and the besiegers, when lodged in it, are continually exposed to the bombs, granades, and other fire-works, which are thrown incessantly from the rampart into their works. In the middle of dry moats, there is sometimes another small one, called *cunette*; which is generally dug so deep till they find water to fill it.

The deepest and broadest moats are accounted the best; but a deep one is preferable to a broad one: the ordinary breadth is about 20 fathoms, and the depth about 16.

To drain a moat that is full of water, they dig a trench deeper than the level of the water, to let it run off; and then throw hurdles upon the mud and slime, covering them with earth or bundles of rushes, to make a sure and firm passage.

MOATAZALITES, or **SEPARATISTS**, a religious sect among the Turks, who deny all forms and qualities in the Divine Being; or who divest God of his attributes.

There are two opinions among the Turkish divines concerning God. The first admits metaphysical forms or attributes; as, that God has wisdom, by which he is wise; power, by which he is powerful; eternity, by which he is eternal, &c. The second allows God to be wise, powerful, eternal; but will not allow any form or quality in God, for fear of admitting a multiplicity. Those who follow this latter opinion are called *Moatazalites*; they who follow the former, *Sephalites*.

The Moatazalites also believed that the word of God was created in *subjeeto*, as the schoolmen term it, and to consist of letters and sound; copies thereof being written in books to express or imitate the original; they denied absolute predestination, and affirmed that man is a free agent. This sect is said to have first invented the scholastic divinity, and is subdivided into no less than 20 inferior sects, which mutually brand one another with infidelity.

MOBILE, **MOVEABLE**, any thing susceptible of motion, or that is disposed to be moved either by itself or by some other prior *mobile* or mover.

Primum MOBILE, in the ancient astronomy, was a ninth heaven or sphere, imagined above those of the planets and fixed stars. This was supposed to be the

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Mobile,
Mocha.

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Mode.

first mover, and to carry all the lower spheres round along with it; by its rapidity communicating to them a motion whereby they revolved in 24 hours. But the diurnal revolution of the planets is now accounted for without the assistance of any such *primum mobile*.

Perpetuum MOBILE. See *Perpetual MOTION*.

MOCHO, *Moco*, or *Mokha*; by some supposed to be the *Musa* or *Muza* of Ptolemy, is a port and town on the Red Sea, of considerable trade; contains about 10,000 inhabitants, Jews, Armenians, and Mohammedans; is surrounded with walls after the ancient manner; and has four gates and four towers, the last mounted with cannon; but there is no ditch. It gives name to a kingdom extending along the most southern coast of Arabia; of which that part which lies next the sea is a dry barren desert, in some places 10 or 12 leagues over; but bounded by mountains, which being well watered, enjoy an almost perpetual spring; and besides coffee, the peculiar produce of this country, yields corn, grapes, myrrh, frankincense, cassia, balm, gums of several sorts, mangos, dates, pomegranates, &c. The weather here is so hot and sultry in summer, especially when the south wind blows, that it would be insupportable, if it was not mitigated by the cool breezes that generally blow from the mountains on the north, or the Red and Arabic Seas on the west and east. The heat in winter is equal to that of our warmest summers; and it is very seldom that either clouds or rain are seen. The city of Mocha is now the emporium for the trade of all India to the Red Sea. The trade was removed hither from Aden, in consequence of the prophecy of a sheik, much revered by the people, who foretold that it would soon become a place of extensive commerce notwithstanding its disadvantageous situation. It stands close to the sea, in a large, dry, and sandy plain, that affords no good water within 20 miles of the city; what they drink comes from Mofa, and costs as dear as small-beer in England. The water near the town, as it is thought, produces a worm, which the naturalists call the *dracunculus*, which is about two feet and a half long, very slender, and breeds in the fleshy parts of the body: in extracting it great care must be used, the consequence being dangerous if any part of it remains in the body. The buildings here are lofty, and tolerably regular, having a pleasant aspect from Mecca. The steeples of several mosques are very high, presenting themselves to view at a great distance. Their markets are well stored with beef, mutton, lamb, kid, camels, and antelopes flesh, common fowls, Guinea hens, partridges, and pigeons. The sea affords plenty of fish, but not savoury; which some think proceeds from the extreme saltness of the water and the nature of their aliment. The markets are also stocked with fruit, such as grapes, peaches, apricots, quinces, and nectarines; although neither shrub nor tree is to be seen near the town, except a few date-trees. Frequently no rain falls here in two or three years, and seldom more than a shower or two in a year; but in the mountains, at the distance of about 20 miles from Mokha, the earth is watered with a gentle shower every morning, which makes the valleys fertile in corn and the fruits natural to the climate. The Arab inhabitants, though remarkably grave and superstitious, are said to be extremely covetous and hypocritical;

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robbing, thieving, and committing piracy, without the least scruple or remorse. The English and Dutch companies have handsome houses here, and carry on a great trade in coffee, olibanum, myrrh, aloes, liquid storax, white and yellow arsenic, gum-arabic, mummy, balm of Gilead, and other drugs. One inconvenience, however, they sustain from the violence and exactions of the Arabian princes; but the king's customs are easy, being fixed at three *per cent.* to Europeans. Of the coins at Mocha, the most current is the camassie, which rises and falls in value at the banker's discretion: they are from 50 to 80 for a current dollar, which is but an imaginary species, being always reckoned one and a half *per cent.* lower than Spanish dollars. As to their weights, they are almost infinite, according to the nature of the thing to be weighed: they have the banian weight, the magnet, the ambergris, the agala, the gold and silver weights, &c.

MOCK-ORE, or *Mock-Lead*. See **BLINDE**.

MOCKING-BIRD, in ornithology. See **TURDUS**.

MOCOCO. See **LEMUR**.

MODE, which is a word of the same general import with **MANNER**, is used as a technical term in grammar, metaphysics, and music. For its import in **GRAMMAR**, see that article, n° 80.

MODE, in metaphysics, seems properly to denote the manner of a thing's existence: but Locke, whose language in that science is generally adopted, uses the word in a sense somewhat different from its ordinary and proper signification. "Such complex ideas, which, however compounded, contain not in them the supposition of subsisting by themselves, but are considered as dependencies on, or affections of, substances," he calls *modes*. Of these *modes*, there are, according to him, two sorts, which deserve distinct consideration. First, there are some "which are only variations, or different combinations of the same simple idea, without the mixture of any other, as a *dozen* or a *score*; which are nothing but the ideas of so many distinct units added together;" and these he calls *simple modes*. Secondly, "there are others compounded of simple ideas of several kinds put together to make one complex one; *v. g.* *beauty*, consisting of a certain composition of colour and figure, causing delight in the beholder; *theft*, which being the concealed change of the possession of any thing without the consent of the proprietor, contains, as is visible, a combination of several ideas of several kinds;" and these he calls *mixed modes*. For the just distinction between *ideas* and *notions*, as well as between *ideas* and the *qualities* of external objects, which in this account of modes are all confounded together, see **METAPHYSICS**.

MODE, in music; a regular disposition of the air and accompaniments relative to certain principal sounds upon which a piece of music is formed, and which are called the *essential sounds of the mode*.

There is this difference between the mode and the tone, that the latter only determines the principal sound, and indicates the place which is most proper to be occupied by that system which ought to constitute the basis of the air; whereas the former regulates the thirds, and modifies the whole scale agreeably to its fundamental sounds.

Our *modes* are not, like those of the ancients, characterized

A a

Mode.

characterised by any sentiment which they tend to excite, but result from our system of harmony alone. The sounds essential to the mode are in number three, and form together one perfect chord. 1. The tonic or key, which is the fundamental note both of the tone and of the mode: (See TONE and TONIC). 2. The dominant, which is a fifth from the tonic: (See DOMINANT). 3. The mediant, which properly constitutes the *mode*, and which is a third from the same tonic. As this third may be of two kinds, there are of consequence two different modes. When the mediant forms a greater third with the tonic, the mode is major; when the third is lesser, it is minor.

The major mode is immediately generated by the resonance of sounding bodies, which exhibit the third major of the fundamental sound: but the minor mode is not the product of nature; it is only found by analogy and inversion. This is equally true upon the system of Sig. Tartini as upon that of M. Rameau.

This last author, in his various and successive publications, has explained the origin of this minor mode in different ways, of which his interpreter M. d'Alembert was satisfied with none. It is for this reason that he has founded this origin on a different principle, which cannot be better explained than in the words of that eminent geometrician. See MUSIC, Art. 28, 29, 30, and 31.

When the mode is once determined, every note in the scale assumes a name expressive of its relation to the fundamental sound, and peculiar to the place which it occupies in that particular mode. We subjoin the names of all the notes significant of their relative values and places in each particular *mode*, taking the octave of *ut* as an example of the major *mode*, and of *la* as an example of the minor.

Major, <i>ut</i>	<i>re</i>	<i>mi</i>	<i>fa</i>	<i>sol</i>	<i>la</i>	<i>si</i>	<i>ut</i> ,
Minor, <i>la</i>	<i>si</i>	<i>ut</i>	<i>re</i>	<i>mi</i>	<i>fa</i>	<i>sol</i>	<i>la</i> .
Tonic.	Second note.	Mediant.	Sub-dominant.	Fourth note, or Dominant.	Sub-dominant.	Sixth note, or Seventh note.	Octave.

It is necessary to remark, that when the seventh note is only a semitone distant from the highest in the octave, that is to say, when it forms a third major with the dominant, as *si* natural in the major *mode*, or *sol* sharp in the minor, that seventh sound is then called a *sensible note*, because it discovers the tonic and renders the tone appreciable.

Nor does each gradation only assume that name which is suitable to it; but the nature of each interval is determined according to its relation to the *mode*. The rules established for this are as follow:

1. The second note must form a second major above the tonic, the fourth note and the dominant should form a fourth and fifth exactly true; and this equally in both modes.

2. In the major mode, the mediant or third, the sixth and the seventh from the tonic, should always be major; for by this the mode is characterized. For the same reason these three intervals ought always to be minor in the minor mode: nevertheless, as it is necessary that the *sensible note* should likewise there

be perceived, which cannot be effectuated without a false relation whilst the sixth note still remains minor; this occasions exceptions, of which in the course of the air or harmony care must be taken. But it is always necessary that the cleff, with its transpositions, should preserve all the intervals, as determined with relation to the tonic, according to the species of the *mode*. For this a general rule will be found at the word *Cleff*, in Rousseau's Musical Dictionary.

As all the natural chords in the octave of *ut* give, with relation to that tonic, all the intervals prescribed for the major *mode*, and as the case is the same with the octave of *la* for the minor mode, the preceding example, which was only given that we might have an opportunity of naming the notes, may likewise serve as a formula for the rule of the intervals in each *mode*.

This rule is not, as one might imagine, established upon principles that are merely arbitrary: it has its source in the generation of harmony, at least in a certain degree. If you give a perfect major chord to the tonic, to the dominant, and the sub-dominant, you will have all the sounds of the diatonic scale for the major *mode*: to obtain that of the minor, leaving still its third major to the dominant, give a third minor to the two other chords. Such is the analogy of the mode.

As this mixture of major and minor chords introduces into the minor mode a false relation between the sixth and the sensible note, to avoid this false relation, they sometimes give the third major to the fourth note in ascent, or the third minor to the dominant in descending, chiefly by inverting the chords; but these in this case are licences.

There are properly no more than two *modes*, as we have seen: but there are twelve different sounds in the octave which may be made fundamental sounds, and of consequence form as many keys or tones; and as each of these tones are susceptible of the major or minor mode, music may be composed in twenty-four modes or manners. Nay, in the manner of writing music, there are even thirty-four passable modes: but in practice ten are excluded; which when thoroughly examined are nothing else but a repetition of the other ten, under relations much more difficult, in which all the chords must change their names, and where it must cost any one some trouble to know what he is about. Such is the major mode upon a note raised above its natural pitch by a semitone, and the minor mode upon a note depressed by a semitone. Thus, instead of composing upon *sol* sharp with a third major, it is much more eligible to operate upon *la* flat, which will give you an opportunity to employ the same tones; and instead of composing upon *re* flat with a third minor, you will find it more convenient to choose *ut* sharp for the same reason; viz. on one hand to avoid a *fa* with a double sharp, which would be equivalent to a *sol* natural; and on the other hand a *si* with a double flat, which would become a *la* natural.

The composer does not always continue in the same *mode*, nor in the same *key*, in which he has begun an air; but, whether to alter the expression or introduce variety, *modes* and *keys* are frequently changed, according to the analogy of harmony; yet always returning to those which have been first heard: this is called *modulation*.

From

Mode.

From thence arises a new division of *modes* into such as are *principal* and such as are *relative*: the principal is that in which the piece begins and ends; the relative modes are such as the composer interweaves with the principal in the flow of the harmony. (See MODULATION).

Others have proposed a third species, which they call a *mixed mode*, because it participates the modulation of both the others, or rather because it is composed of them; a mixture which they did not reckon an inconveniency, but rather an advantage, as it increases the variety, and gives the composer a greater latitude both in air and harmony.

This new mode, not being found by the analysis of the three chords like the two former, is not determined, like them, by harmonics essential to the mode, but by an entire scale which is peculiar to itself, as well in rising as descending; so that in the two modes above-mentioned the scale is investigated by the chords, and in this mixed mode the chords are investigated by the scale. The following notes exhibit the form of this scale in succession, as well rising as descending:

mi fa sol la si ut re mi.

Of which the essential difference is, as to the *melody*, in the position of the two semitones; of which the first is found between the first and the second note, and the last between the fifth and sixth; and, with respect to the *harmony*, the difference consists in this, that upon its tonic it carries a third minor in the beginning, and major in ending, in the accompaniment of this scale, as well in rising as descending, such as it has been given by those who proposed it, and executed at a spiritual concert, May 30, 1751.

They object to its inventor, That his mode has neither chords nor harmony essential to itself, nor cadences which are peculiar to it, and which sufficiently distinguish it from the major or minor mode. He answers to this, That the distinction of his mode is less in harmony than in melody, and less even in the mode itself than in the modulation; that in its beginning it is distinguished from the major mode by its third minor, and in its end from the minor mode by its plagal cadence. To which his opponents reply, That a modulation which is not exclusive cannot be sufficient to establish a mode; and that his must inevitably occur in the two other modes, and above all in the minor: and, as to his plagal cadence, that it necessarily takes place in the minor mode as often as transition is made from the chord of the tonic to that of the dominant, as has long been the case in practice, even upon final notes, in plagal modes, and in the tone proper to the fourth. From whence it is concluded, that his mixed mode is not so much a particular species, as a new denomination for the manner of interweaving and combining the major and minor modes, as ancient as harmony, practised at all periods; and this appears to be so true, that, even when he begins his scale, its author will neither venture to give the fifth nor the sixth to his tonic, for fear lest by the first the tonic should be determined in the minor mode, or the mediant in the major mode by the second. He leaves the harmony equivocal by not filling up his chord.

But whatever objections may be made against the

mixed mode, whose name is rather rejected than its practice, this will not prevent the author from appearing as a man of genius, and a musician profoundly learned in the principles of his art, by the manner in which he treats it, and the arguments which he uses to establish it.

MODE *Major.* }
MODE *Minor.* } See INTERVAL.

MODEL, in a general sense, an original pattern, proposed for any one to copy or imitate.

This word is particularly used, in building, for an artificial pattern made in wood, stone, plaster, or other matter, with all its parts and proportions, in order for the better conducting and executing some great work, and to give an idea of the effect it will have in large. In all great buildings, it is much the surest way to make a model in relievo, and not to trust to a bare design or draught. There are also models for the building of ships, &c. and for extraordinary staircases, &c.

They also use models in painting and sculpture; whence, in the academies, they give the term *model* to a naked man or woman, disposed in several postures, to afford an opportunity to the scholars to design him in various views and attitudes.

Models in imitation of any natural or artificial substance, are most usually made by means of moulds composed of plaster of Paris. For the purpose of making these moulds, this kind of plaster is much more fit than any other substance, on account of the power it has of absorbing water, and soon condensing into an hard substance, even after it has been rendered so thin as to be of the consistence of cream. This happens in a shorter or longer time as the plaster is of a better or worse quality; and its good or bad properties depend very much upon its age, to which, therefore, particular regard ought to be had. It is sold in the shops at very different prices; the finest being made use of for casts, and the middling sort for moulds. It may be very easily coloured by means of almost any kind of powder excepting what contains an alkaline salt; for this would chemically decompose the substance of it, and render it unfit for use. A very considerable quantity of chalk would also render it soft and useless, but lime hardens it to a great degree. The addition of common size will likewise render it much harder than if mere water is made use of. In making either moulds or models, however, we must be careful not to make the mixture too thick at first; for if this is done, and more water added to thin it, the composition must always prove brittle and of a bad quality.

The particular manner of making models (or *casts*, as they are also called) depends on the form of the subject to be taken. The process is easy, where the parts are elevated only in a slight degree, or where they form only a right or obtuse angle with the principal surface from which they project; but where the parts project in smaller angles, or form curves inclined towards the principal surface, the work is more difficult. This observation, however, holds good only with regard to hard and inflexible bodies; for such as are soft may often be freed from the mould, even though they have the shape last mentioned. But

A a 2

Mode,
Model.

¹ Different kinds of models.

² General method of making models.

Model. though this be the case with the soft original substance, it is not so with the inflexible model when once it is cast.

The moulds are to be made of various degrees of thickness, according to the size of the model to be cast; and may be from half an inch to an inch, or, if very large, an inch and an half. Where a number of models are to be taken from one mould, it will likewise be necessary to have it of a stronger texture than where only a few are required, for very obvious reasons.

3 Anatomical models. It is much more easy to make a mould for any soft substance than a rigid one, as in any of the viscera of the animal body: for the fluidity of the mixture makes it easily accommodate itself to the projecting parts of the substance; and as it is necessary to inflate these substances, they may be very readily extracted again by letting out the air which distended them.

When a model is to be taken, the surface of the original is first to be greased, in order to prevent the plaster from sticking to it; but if the substance itself is slippery, as is the case with the internal parts of the human body, this need not be done: when necessary, it may be laid over with linseed oil by means of a painter's brush. The original is then to be laid on a smooth table, previously greased or covered with a cloth, to prevent the plaster sticking to it; then surround the original with a frame or ridge of glazier's putty, at such a distance from it as will admit the plaster to rest upon the table on all sides of the subject for about an inch, or as much as is sufficient to give the proper degree of strength to the mould. A sufficient quantity of plaster is then to be poured as uniformly as possible over the whole substance, until it be every where covered to such a thickness as to give a proper substance to the mould, which may vary in proportion to the size. The whole must then be suffered to remain in this condition till the plaster has attained its hardness; when the frame is taken away, the mould may be inverted, and the subject removed from it; and when the plaster is thoroughly dry let it be well seasoned.

Having formed and seasoned the moulds, they must next be prepared for the casts by greasing the inside of them with a mixture of olive oil and lard in equal parts, and then filled with fine fluid plaster, and the plain of the mould formed by its resting on the surface of the table covered to a sufficient thickness with coarse plaster, to form a strong basis or support for the cast where this support is requisite, as is particularly the case where the thin and membranous parts of the body are to be represented. After the plaster is poured into the mould, it must be suffered to stand until it has acquired the greatest degree of hardness it will receive; after which the mould must be removed: but this will be attended with some difficulty when the shape of the subject is unfavourable; and in some cases the mould must be separated by means of a small mallet and chisel. If by these instruments any parts of the model should be broken off, they may be cemented by making the two surfaces to be applied to each other quite wet; then interposing betwixt them a little liquid plaster; and lastly, the joint smoothed after being thoroughly dry. Any small holes that may be made in the mould can be filled up with liquid pla-

ster, after the sides of them have been thoroughly wetted, and smoothed over with the edge of a knife.

In many cases it is altogether impracticable to prepare a mould of one piece for a whole subject; and therefore it must be considered how this can be done in such a manner as to divide the mould into the fewest pieces. This may be effected by making every piece cover as much of the pattern as possible, without surrounding such projecting parts, or running into such hollows as would not admit a separation of the mould. It is impossible, however, to give any particular directions in this matter which can hold good in every instance, the number of pieces of which the mould is to consist being always determined from the shape of the pattern. Thus the mould of the human calculus will require no more than three pieces, but that of an *os femoris* could scarce have fewer than ten or twelve.—Where any internal pieces are required, they are first to be made, and then the outer pieces after the former have become hard.

To make a mould upon an hard and dry substance, we must, in the first place, rub the surface of it smoothly over with the mixture of oil and lard above-mentioned. Such hollows as require internal pieces are then to be filled up with fluid plaster; and while it continues in this state, a wire loop must be introduced into it, by which, when hardened, it can be pulled off. The plaster should be somewhat raised in a pyramidal form around this wire, and afterwards cut smooth with a knife while yet in its soft state; preserving two or three angular ridges from the loop to the outer edge, that it may fix the more steadily in the outer piece of the mould to be afterwards made upon it. Let the outer piece then be well greased, to prevent the second piece from adhering; the loop being inclosed with some glazier's putty, both to prevent the second piece from adhering and to preserve an hollow place for the cord.

To form the second or outside piece, mix a quantity of plaster proportioned to the extent of surface it is to cover and the intended thickness of the mould: when it is just beginning to thicken, or assumes such a consistence as not to run off very easily, spread it over the internal piece or pieces as well as the pattern, taking care at the same time not to go too far lest it should not deliver safely; and as the plaster becomes more tenacious, add more upon the pattern until it has become sufficiently thick, keeping the edges square and smooth like the edge of a board. The plaster should be spread equally upon all parts, which is best done by a painter's pallet-knife or apothecary's bolus-knife: but for this the instrument should be somewhat less pliable than it is commonly made.

When the outside piece is hardened, the edges are to be pared smooth, and nearly made square with a small pointed knife. Little holes of a conical shape are to be made with the point of a knife about an inch distant from one another, according to the size of the piece. These are designed to receive the fluid plaster in forming the adjacent parts of the mould, and occasion points corresponding to the hollows; and are intended to preserve the edges of the different pieces steadily in their proper relative situations. The third piece is then to be formed in a manner similar to the second;

Model. second; greasing the edges of the former plentifully with hog's lard and oil, to prevent the pieces from adhering to each other. Thus the pattern is to be wholly inclosed, only leaving a proper orifice for pouring in the plaster to form the model; small holes being also bored in the mould opposite to the wire-loops fixed in the inside pieces, through which a cord is to be conveyed from the loop to confine such pieces during the time of casting. In some cases, however, it is not necessary that the mould should totally inclose the pattern; for instance, where a model is to be made of a pedestal, or a bust of any part of the human body. The bottom of such moulds being left open, there is accordingly ample room for pouring in the plaster.

After the mould is completely formed, it is next to be dried either naturally or by a gentle artificial heat, and then seasoned in the following manner:— Having been made thoroughly dry, which, if the mould is large, will require two or three weeks, it is to be brushed over plentifully with linseed oil boiled with sugar of lead, finely levigated litharge, or oil of vitriol. The inside and joints of the mould should be particularly well supplied with it. If the mould be large, it is needless to attend to the outside: but when the moulds are small, it will not be improper to boil them in the oil; by which means their pores are more exactly filled than could otherwise be done. After the moulds have undergone this operation, they are again set by to dry, when, being greased with olive-oil and hog's lard, they are fit for use. If linseed oil be used for greasing the moulds, it will in a short time impart a disagreeable yellow colour to the casts.

The mould being properly prepared and seasoned, nothing more is requisite to form the model than to pour the finest liquid plaster of Paris into it. After a layer of this, about half an inch in thickness, has been formed all round the mould, we may use the coarser kind to fill it up entirely, or to give to the model what thickness we please.

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Models from living subjects. Besides the models which are taken from inanimate bodies, it has been frequently attempted to take the exact resemblance of people while living, by using their face as the original of a model, from whence to take a mould; and the operation, however disagreeable, has been submitted to by persons of the highest ranks in life. A considerable difficulty occurs in this, however, by reason of the person's being apt to shrink and distort his features when the liquid is poured upon him; neither is he altogether without danger of suffocation, unless the operator well understands his business.

To avoid the former inconvenience, it will be proper to mix the plaster with warm instead of cold water, by which means the person will be under no temptation to shrink; and to prevent any danger of a fatal accident, the following method is to be practised: Having laid the person horizontally on his back, the head must first be raised by means of a pillow to the exact position in which it is naturally carried when the body is erect; then the parts to be represented must be very thinly covered over with fine oil of almonds by means of a painter's brush: the face is then to be first covered with fine fluid plaster, begin-

ning at the upper part of the fore-head, and spreading it over the eyes, which are to be kept close, that the plaster may not come in contact with the globe; yet not closed so strongly as to cause any unnatural wrinkles. Cover then the nose and ears, plugging first up the *meatus auditorii* with cotton, and the nostrils with a small quantity of tow rolled up, of a proper size, to exclude the plaster. During the time that the nose is thus stopped, the person is to breathe through the mouth: in this state the fluid plaster is to be brought down low enough to cover the upper lip, observing to leave the rolls of tow projecting out of the plaster. When the operation is thus far carried on, the plaster must be suffered to harden; after which the tow may be withdrawn, and the nostrils left free and open for breathing. The mouth is then to be closed in its natural position, and the plaster brought down to the extremity of the chin. Begin then to cover that part of the breast which is to be represented, and spread the plaster to the outsides of the arms and upwards, in such a manner as to meet and join that which is previously laid on the face: when the whole of the mass has acquired its due hardness, it is to be cautiously lifted, without breaking or giving pain to the person. After the mould is constructed, it must be seasoned in the manner already directed; and when the mould is cast, it is to be separated from the model by means of a small mallet and chissel. The eyes, which are necessarily shown closed, are to be carved, so that the eye-lids may be represented in an elevated posture; the nostrils hollowed out, and the back part of the head, from which, on account of the hair, no mould can be taken, must be finished according to the skill of the artist. The edges of the model are then to be neatly smoothed off, and the bust fixed on its pedestal.

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The method of making models in the plaster of Paris is undoubtedly the most easy way of obtaining ^{Topographical models.} them. When models, however, are made of such large objects that the model itself must be of considerable size, it is vain to attempt making it in the way above described. Such models must be constructed by the hand with some soft substance, as wax, clay, putty, &c. and it being necessary to keep all the proportions with mathematical exactness, the construction of a single model of this kind must be a work of great labour and expence as well as of time. Of all those which have been undertaken by human industry, however, perhaps the most remarkable is that constructed by General Pfiffer, to represent the mountainous parts of Switzerland. It is composed of 142 compartments, of different sizes and forms, respectively numbered, and so artfully put together, that they can be separated and replaced with the greatest ease. The model itself is 20½ feet long and 12 broad, and formed on a scale which represents two English miles and a quarter by an English foot; comprehending part of the cantons of Zug, Zurich, Schweitz, Underwalden, Lucerne, Berne, and a small part of the mountains of Glarus; in all, an extent of country of 18½ leagues in length and 12 in breadth. The highest point of the model, from the level of the centre (which is the lake of Lucerne), is about ten inches; and as the most elevated mountain represented therein rises 1475 toises.

Model,
Modera.

toises or 9440 feet above the lake of Lucerne, at a gross calculation, the height of an inch in the model is about 900 feet. The whole is painted of different colours, in such a manner as to represent objects as they exist in nature; and so exactly is this done, that not only the woods of oak, beech, pine, and other trees, are distinguished, but even the strata of the several rocks are marked, each being shaped upon the spot, and formed of granite, gravel, or such other substances as compose the natural mountain. So minute also is the accuracy of the plan, that it comprises not only all the mountains, lakes, rivers, towns, villages, and forests, but every cottage, bridge, torrent, road, and even every path is distinctly marked.

The principal material employed in the construction of this extraordinary model, is a mixture of charcoal, lime, clay, a little pitch, with a thin coat of wax; and is so hard that it may be trod upon without any damage. It was begun in the year 1766, at which time the general was about 50 years of age, and it employed him till the month of August 1785; during all which long space of time he was employed in the most laborious and even dangerous tasks.—He raised the plans with his own hands on the spot, took the elevation of mountains, and laid them down in their several proportions. In the prosecution of this laborious employment he was twice arrested for a spy; and in the popular cantons was frequently forced to work by moon-light, in order to avoid the jealousy of the peasants, who imagined that their liberty would be endangered should a plan of their country be taken with such minute exactness. Being obliged frequently to remain on the tops of some of the Alps, where no provisions could be procured, he took along with him a few milk-goats, who supplied him with nourishment. When any part was finished, he sent for the people residing near the spot, and desired them to examine each mountain with accuracy, whether it corresponded, as far as the smallness of the scale would admit, with its natural appearance; and then, by frequently retouching, corrected the deficiencies. Even after the model was finished, he continued his Alpine expeditions with the same ardour as ever, and with a degree of vigour that would fatigue a much younger person. All his elevations were taken from the level of the lake of Lucerne; which, according to M. Saussure, is 1408 feet above the level of the Mediterranean.

MODENA, a duchy of Italy, bounded on the south by Tuscany and the republic of Lucca, on the north by the duchy of Mantua, on the east by the Bolognese and the territories of the church, and on the west by the duchy of Parma; extending in length from south to north about 56 English miles, and in breadth between 24 and 36, and yielding plenty of corn, wine, and fruits, with mineral waters. In some places also petroleum is skimmed off the surface of the water of deep wells made on purpose; and in others is found a kind of earth or tophus, which, when pulverised, is said to be an excellent remedy against poison, fevers, dysenteries, and hypochondriac disorders. The country of La Salsa affords several kinds of petrifications. The principal rivers are the Crostolo, Secchia, and Panaro. The family of Esté, dukes of Modena, is very ancient. They had their

name from Esté, a small city in the district of Padua. In 1753, the duke was appointed imperial vicar-general, field-marshal, and governor, of the Milanese during the minority of the archduke Peter Leopold, who was declared governor-general of the Austrian Lombardy. The duke, though a vassal of the empire, hath an unlimited power within his own dominions.

MODENA, an ancient city, in Latin *Mutina*, which gives name to a duchy of Italy, and is its capital. It stands 28 miles east of Parma, 44 almost south of Mantua, and 20 west of Bologna; and is a pretty large and populous, but not a handsome city. It is much celebrated by Roman authors for its grandeur and opulence; but was a great sufferer by the siege it underwent during the troubles of the triumvirate. It hath long been the usual residence of the dukes; and is also the see of a bishop, who is suffragan to the archbishop of Bologna. Mr Keyser says, that when Decius Brutus was besieged here by Mark Antony, Hirtius the consul made use of carrier-pigeons; and that, even at this day, pigeons are trained up at Modena to carry letters and bring back answers. This city hath given birth to several celebrated persons, particularly Tasso the poet, Correggio the great painter, Sigonius the civilian and historian, da Vinci the architect, and Montecuculi the imperial general. The tutelary saint of it is named *Geminianus*. The ducal palace is a very noble edifice, in which, among the other fine pictures, the birth of Christ by Correggio, called *la Notte Felice*, is much celebrated. The only manufacture for which this city is noted, is that of masks, of which great numbers are exported. The churches of the Jesuits, of the Theatines, and of St Dominic, are well worth viewing. In the college of St Carlo Borromeo between 70 and 80 young noblemen are continually maintained, and instructed both in the sciences and genteel exercises. St Beatrix, who was of the family of Esté, is said to knock always at the gate of the palace three days before any of the family dies. Before most of the houses are covered walks or porticos, as at Bologna. The city is fortified, and on its south side stands the citadel.

MODERATION, in ethics, is a virtue consisting in the proper government of our appetites, passions, and pursuits, with respect to honours, riches, and pleasures; and in this sense it is synonymous with *temperance*: it is also often used to denote *candour*.

MODERATOR, in the schools, the person who presides at a dispute, or in a public assembly: thus the president of the annual assembly of the church of Scotland is styled *moderator*.

MODERN, something new, or of our time; in opposition to what is antique or *ancient*.

Modern Authors, according to Naude, are all those who have wrote since Boethius. The modern philosophy commences with Galileo; the modern astronomy with Copernicus.

MODESTY, in ethics, is sometimes used to denote humility; and sometimes to express chastity, or purity of sentiments and manners.—Modesty, in this last sense, and as particularly applied to women, is defined by the authors of the *Encyclopédie Methodique*, as a natural, chary, and honest shame; a secret fear; a feeling

Modena
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Modesty.

Modesty. feeling on account of what may be accompanied with disgrace. Women who possess only the remains of a suspicious modesty, make but feeble efforts to resist: those who have obliterated every trace of modesty from their countenance, soon extinguish it completely in their soul, and throw aside for ever the veil of decency. She, on the contrary, who truly possesses modesty, passes over in silence attempts against her honour, and forbears speaking of those from whom she has received an outrage, when in doing so she must reveal actions and expressions that might give alarm to virtue.

The idea of modesty is not a chimera, a popular prejudice, or an illusion arising from laws and education. Nature, which speaks the same language to all men, has, with the unanimous consent of nations, annexed contempt to female incontinence. To resist and to attack are laws of her appointment: and while she bestows desires on both parties, they are in the one accompanied with boldness, in the other with shame. To individuals she has allotted long spaces of time for the purposes of self-preservation, and but moments for the propagation of their species. What aims more gentle than *Modesty* could she have put into the hands of that sex which she designed to make resistance!

If it were the custom for both sexes to make and receive advances indiscriminately, vain importunity would not be prevented: the fire of passion would never be stirred up, but languish in tedious liberty; the most amiable of all feelings would scarcely warm the human breast; its object would with difficulty be attained. That obstacle which seems to remove this object to a distance, in fact brings it nearer. The veil of shame only makes the desires more attractive. Modesty kindles that flame which it endeavours to suppress: its fears, its evasions, its caution, its timid avowals, its pleasing and affecting finesses, speak more plainly what it wishes to conceal, than passion can do without it: it is *MODESTY*, in short, which enhances the value of a favour, and mitigates the pain of a refusal.

Since modesty is the secret fear of ignominy; and since all nations, ancient or modern, have confessed the obligation of its laws; it must be absurd to violate them in the punishment of crimes, which should always have for its object the re-establishment of order. Was it the intention of those oriental nations, who exposed women to elephants, trained for an abominable species of punishment, to violate one law by the observance of another? By an ancient practice among the Romans, a girl could not be put to death before she was marriageable. Tiberius found means to evade this law by ordering them to be violated by the executioner previous to the infliction of punishment; the refinement of a cruel tyrant, who sacrificed the morals to the customs of his people! When the legislature of Japan caused women be exposed naked in the market-places, and obliged them to walk on all fours like brutes, modesty was shocked: but when it wanted to force a mother—when it wanted to compel a son—nature received an outrage.

Such is the influence of climate in other countries, that the physical part of love possesses an almost irresistible force. The resistance is feeble; the attack is accompanied with a certainty of success. This is the

case at Patana, at Bantam, and in the small kingdoms on the coast of Guinea. When the women in these countries (says Mr Smith) meet with a man, they lay hold of him, and threaten to inform their husbands if he despises their favours. But here the sexes seem to have abolished the laws peculiar to each. It is fortunate to live in a temperate climate like ours, where that sex which possesses the most powerful charms exerts them to embellish society; and where modest women, while they reserve themselves for the pleasures of one, contribute to the amusement of all.

MODIFICATION, in philosophy, that which modifies a thing, or gives it this or that manner of being. Quantity and quality are accidents which modify all bodies.

Decree of MODIFICATION, in Scots law, a decree ascertaining the extent of a minister's stipend, without proportioning it among the persons liable in payment.

MODILLIONS, in architecture, ornaments in the cornice of the Ionic, Corinthian, and Composite columns.

MODIUS, a Roman dry measure for all sorts of grain, containing 32 heminae, or 16 sextarii, or one-third of the amphora, amounting to an English peck. See *MEASURE*.

MODREVIUS (Andreas Frichius), secretary to Sigismund Augustus king of Poland, acquired considerable reputation by his learning and works. He broke off from the Romish church, favoured the Lutherans and Anti-trinitarians, and took great pains in order to unite all Christian societies under the same communion. Grotius has placed him in the class of the reconcilers of the different schemes of religion. His principal work is intitled, *De republica emendanda*.

MODULATION, the art of forming any thing to certain proportion.

MODULATION, in reading, or speaking. See *READING*.

MODULATION, in music, derived from the Latin *modulari*. This word in our language is susceptible of several different significations. It frequently means no more than an air, or a number of musical sounds properly connected and arranged. Thus it answers to what Mr Malcolm understands by the word *tune*, when he does not expressly treat concerning the tuning of instruments. Thus likewise it expresses the French word *chant*; for which reason, in the article *MUSIC*, we have frequently expressed the one word by the other. But the precise and technical acceptation to which it ought to be confined, is the art of composing melody or harmony agreeably to the laws prescribed by any particular key, that of changing the key, or of regularly and legitimately passing from one key to another. In what remains to be said upon the subject we follow Rousseau.

Modulation (says he) is properly the manner of ascertaining and managing the modes; but at this time the word most frequently signifies the art of conducting the harmony and the air successively through several modes, in a manner agreeable to the ear and conformed to rules.

If the different modes be produced by harmony, from thence likewise must spring the laws of modulation.

Modifica-
tion
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Modula-
tion.

Modulation.

Modulation.

tion. These laws are simple in conception, but difficult in practice. We proceed therefore to show in what they consist.

To modulate properly in the same tone, it is necessary, 1. To run through all the sounds of it in an agreeable air, frequently repeating the sounds which are most essential to it, and dwelling upon these sounds with the most remarkable emphasis; that is to say, that the chord containing the sensible notes, and that of the tonic, should frequently be heard in it, but under different appearances, and obtained by different procedures to prevent monotony. 2. That repose or cadences should only be established upon these two chords: the greatest liberty, however, which ought to be taken with the rule is, that a cadence or repose may be established on the chord of the subdominant. 3. In short, that none of the sounds of the mode ought ever to be altered; for without quitting it we cannot introduce a sharp or a flat which does not belong to it, nor abstract any one which in reality does belong to it.

But passing from one mode to another, we must consult analogy, we must consider the relations which a key bears to the other notes in the series, and to the number of sounds common to both the modes, that from whence we pass, and that into which we enter.

If we pass from a mode major, whether we consider the fifth from the key as having the most simple relation with it except that of the octave, or whether we consider it as the first sound which enters into the harmonics of the same key, we shall always find, that this fifth, which is the dominant of the mode, is the chord upon which we may establish the modulation most analogous to that of the principal key.

This dominant, which constituted one of the harmonics of the first key, makes also one of its own peculiar key, of which it is the fundamental sound. There is then a connection between these two chords. Besides, that same dominant carrying, as well as the tonic, a perfect chord major upon the principle of resonance, these two chords are only different one from the other by the dissonance, which passing from the key to the dominant is the sixth superadded, and when reascending from the dominant to the key is the seventh. Now these two chords, thus distinguished by the dissonance which is suitable to each, by the sounds which compose them when ranged in order, form precisely the octave, or the diatonic scale, which we call a *gammut*, which determines the mode.

This same series of the key, altered only by a sharp, forms the scale belonging to the mode of the dominant; which shows how striking the analogy is between these two tones, and gives the easiest opportunity of passing from one to the other by means of one single alteration alone. The mode then of the dominant is the first which presents itself after that of the key in the order of modulations.

The same simplicity of relations which we find between a tonic and its dominant, is likewise found between the same tonic and its sub-dominant: for that fifth, in ascending, which is formed by the dominant with the tonic, is likewise formed by the sub-dominant in descending: but that sub-dominant does not form a fifth with the tonic, except by inversion; it is directly

N° 225.

a fourth, if we take that tonic below, as it ought to be; and which fixes the degree of their relations: for in this sense the fourth, whose ratio is as 3 to 4, immediately follows the fifth, whose ratio is as 2 to 3. So that, if that sub-dominant does not enter into the chord of the tonic, in return the tonic enters into its perfect chord. For let *ut mi sol* be the chord of the tonic, that of the sub-dominant shall be *fa la ut*: thus it is the *ut* which here forms the connection, and the two other sounds of this new chord, are exactly the two dissonances of the preceding. Besides, we need not alter more sounds for this new mode than for that of the dominant; they are both in the one and the other quite the same chords of the principal mode, except one. Add a flat to the sensible note *fi* or B, and all the notes in the mode of *ut* or C will serve for that of *fa* or F. The mode of the sub-dominant then is scarcely less analogous to the principal mode than that of the dominant.

It ought likewise to be remarked, that after having made use of the first modulation in order to pass from a principal mode *ut* or C, to that of the dominant *sol* or G, we are obliged to make use of the second to return to the principal mode: for if *sol* or G be the dominant in the mode of *ut* or C, *ut* is the sub-dominant in the mode of *sol*: thus one of these modulations is no less necessary than the other.

The third sound which enters into the chord of the tonic is that of third formed by its mediant; and, after the preceding, it is likewise the most simple of relations $\frac{2}{3} \frac{3}{4} \frac{4}{5}$. Here then is a new modulation which presents itself, and which is so much the more analogous, because two of the sounds of the principal tonic enter likewise into the minor chord of its mediant: for the former chord being *ut mi sol*, the latter must be *mi sol fi*, where it may be perceived that *mi* and *sol* are common. But what renders this modulation a little more remote, is the number of sounds which are necessary to be altered, even for the minor mode, which is most suitable to this *mi*. In the article *MUSIC* (234.) will be found a table for all the modes; and Rousseau, in his *Musical Dictionary*, has given the formula of a scale both for the major and minor: now, by applying this formula to the minor mode, we find nothing in reality, but the fourth sound *fa* heightened by a sharp in ascending; but in rising, we find two others which are altered, *viz.* the principal tonic *ut*, and its second *re*, which here becomes a sensible note: it is certain that the alteration of so many sounds, and particularly of the tonic, must remove the mode and weaken the analogy.

If we should invert the third as we have inverted the fifth, and take that third below the tonic on the sixth note *la*, which ought here to be called a *sub-median*, or the *mediant below*, we shall form upon this note *la* a modulation more analogous to the principal tone than that of *mi*; for as the perfect chord of this sub-median is *la ut mi*, there once more we find, as in that of the mediant, two of the sounds which enter into the chord of the tonic, *viz.* *ut* and *mi*: and moreover, since the scale of this new key is composed, at least in descending, of the same sounds with that of the principal key; and since it has only two sounds altered in ascending, that is to say, one fewer than the series of the

Modulation.

Modulation
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Moebius.

the mediant; it follows that the modulation of this sixth note is preferable to that of the mediant; and by so much the more, that there the principal tonic forms one of the sounds essential to the mode; which is more proper for approximating the idea of the modulation. The *mi* may afterwards follow.

Here then are four sounds, *mi fa sol la*, upon each of which we may modulate in passing from the major mode of *ut*. *Re* and *fi* remain, which are the two harmonics of the dominant. This last, as being a sensible note, cannot become a tonic by any proper modulation, at least it cannot immediately become one; this would be an abrupt application of ideas too much opposed to the same sounds, and would likewise be to give it a harmony too remote from the principal sound. As to the second note *re*, we may likewise, by favour of a consonant procedure in the fundamental base, modulate upon it in a third minor; but this must be only continued for an instant, that the audience may not have time to forget the modulation of *ut*, which is itself altered in that place; otherwise, instead of returning immediately to *ut*, we must pass through intermediate modes, where we must run great hazard of deviation.

By following the same analogies, we may modulate in the following order, to make our exit from a minor mode; first upon the mediant, afterwards the dominant, next the sub-dominant, then the sub-median, or sixth note. The mode of each of these accessory keys is determined by its mediant taken from the principal sound. For instance, issuing from the major mode of *ut*, to modulate upon its mediant, we render the mode of that mediant minor; because *sol*, the dominant of the principal sound, forms a third minor with that mediant, which is *mi*. On the contrary, in our egress from the minor mode of *la*, we modulate upon its mediant *ut* in the major mode; because *mi*, the dominant of the tone from whence we issue, forms a third major with the key of that into which we enter, &c.

These rules, comprehended in one general formula, import, that the modes of the dominant and of the sub-dominant are like that of the tonic, and that the mediant and the sixth note require a mode opposed. We must, however, remark, that, by the right which we have of passing from the major to the minor, and *vice versa*, upon the same key, we may likewise change the order of modes from one key to another; but whilst we thus remove ourselves from the natural modulation, we must presently think of our return: for it is a general rule, that every piece of music ought to terminate in that key with which it began.

In his Musical Dictionary, plate B, fig. 6. and 7. Rousseau has collected in two examples, which are very short, all the modes to which we may immediately pass; the first, in passing from the major mode; and the second, from the minor. Each note indicates a particular modulation; and the value of the notes in each example likewise shows the relative duration suitable to each of these modes, according to its relation with the principal mode.

These immediate transitions from one mode to another, furnish us with the means of passing by the same rules to modes still more remote, and from thence to return to the principal mode, of which we never should

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lose sight. But it is not sufficient to know what course we ought to pursue; we must likewise be acquainted with the method of entering into it. A summary therefore of the precepts which are given in this department shall immediately follow.

In melody, in order to discover and introduce the modulation which we have chosen, nothing is necessary but to render perceptible the alterations which it causes in the sounds of that mode from whence we issue, to make them proper for the mode into which we enter. Are we now in the major mode of *ut*? there needs no more than to sound the note *fa* sharp, that we may discover the mode of the dominant; or a *fi* flat, that we may show the mode of the sub-dominant. Afterwards you may run over the sounds essential to the mode in which you enter; if it is well chosen, your modulation will always be just and regular.

In harmony, the difficulty is a little increased: for as it is necessary that the change of modes should be made at the same time through all the parts, care must be taken of the harmony, and of the air, that we may avoid pursuing different modulations at the same time. Huygens has happily remarked, that the prohibition of two fifths in immediate succession proceeds upon this rule as its principle: in reality, between two parts it is scarcely possible to form a number of just fifths in uninterrupted succession without operating in two different modes.

To introduce a mode, a great many pretend that it is sufficient to form the perfect chord of its principal sound, and this is indispensable in order to produce the mode. But it is certain, that the mode cannot be exactly determined but by the chord containing the sensible note, or the dominant: we must then cause this chord to be heard when we enter into a new modulation. The most eligible rule would be, That in it the seventh, or minor dissonance, should always be prepared, at least the first time in which it is heard: but this method is not practicable in every admissible modulation; and provided that the fundamental basis proceeds by consonant intervals, that the connection of harmony be observed, the analogy of the mode pursued, and false relations avoided, the modulation will always be approved. Composers prescribe as another rule, That a mode should not be changed except after a perfect cadence: but this interdict is useless, and no person observes it.

All the possible methods of passing from one mode to another, are reducible to five with respect to the major mode, and to four with respect to the minor; which, in the Musical Dictionary, plate B, fig. 8. will be found implied in a fundamental basis intended for each modulation. If there be any other modulation which cannot be resolved into some one of these nine, unless that modulation be enharmonic, it must infallibly be illegitimate. See ENHARMONIC.

MODULE, in architecture, a certain measure, or bigness, taken at pleasure, for regulating the proportions of columns, and the symmetry or disposition of the whole building. Architects generally choose the semidiameter of the bottom of the column for their module, and this they subdivide into parts or minutes.

MOEBIUS (Godfrey), professor of physic at Iena,
B b was

^{II}
Mogodor. Moenius was born at Lauch in Thuringia in 1611. He became first physician to Frederic William elector of Brandenburg, to Augustus duke of Saxony, and to William duke of Saxe-Weimar. He wrote several medical works, which are esteemed; and died at Halle, in Saxony, in 1664.

MOENIUS (Caius), a celebrated Roman consul, conqueror of the ancient Latins, 338 B. C. He was the first who hung up the prows, &c. of the galleys he had taken at the naval engagement of Actium, upon the place where the tribunes harangued the people; from whence it was called the *rostra*.

MÆONIA, or MÆONIA. See MÆONIA and LYDIA.

MÆSIA, or MYRIA, (anc. geog.) a country of Europe, extending from the confluence of the Savus and the Danube to the shores of the Euxine. It was divided into Upper and Lower Mæsia. Lower Mæsia was on the borders of the Euxine, and comprehended that tract of country which received the name of *Pontus* from its vicinity to the sea. Upper Mæsia lay beyond the other, in the inland country.

MOFFAT, a village of Scotland, in the shire of Annandale, 50 miles south-west of Edinburgh; famous for its sulphureous well, which has been in just estimation for near 150 years as a remedy in all cutaneous and scrophulous complaints; and for its chalybeate spring, perhaps the strongest in Britain, which was discovered about 45 years ago, and is of a very bracing quality.—The place is chiefly supported by the company who resort thither for the benefit of its waters and air; but it has also a manufacture of coarse woollen stuffs. It is a well-built clean village; and contains many good and even elegant lodgings, a tolerable assembly-room, a bowling-green and walks, and one of the best inns between London and Edinburgh.

MOFFETTA. See AMPSANCTI.

MOGODORE, or MOGADORE, a large, uniform, and well-built town in the kingdom of Morocco, situated about 350 miles from Tangier on the Atlantic ocean, and surrounded on the land-side by deep and heavy sands. The European factory here consists of about a dozen mercantile houses of different nations, whose owners, from the protection granted them by the emperor, live in full security from the Moors, whom indeed they keep at a rigid distance. They export, to America, mules; to Europe, Morocco leather, hides, gum arabic, gum sandaric, ostrich feathers, copper, wax, wool, elephant's teeth, fine mats, beautiful carpeting, dates, figs, raisins, olives, almonds, oil, &c. In return, they import timber, artillery of all kinds, gunpowder, woollen cloths, linens, lead, iron in bars, all kinds of hardware and trinkets, such as looking-glasses, snuff-boxes, watches, small knives, &c. tea, sugar, spices, and most of the useful articles which are not otherwise to be procured in this empire. The town is regularly fortified on the sea-side; and on the land, batteries are so placed as to prevent any incursion from the southern Arabs, who are of a turbulent disposition, and who, from the great wealth which is known to be always in Mogodore, would gladly avail themselves of any opportunity that offered to pillage the town. The entrance, both by

sea and land, consists of elegant stone arch-ways, with double gates. The market-place is handsomely built, with piazzas of the same materials; and at the water-port there is a customhouse and powder magazine, both of which are neat stone buildings. Besides these public edifices, the emperor has a small but handsome palace for his occasional residence. The streets of the town, though very narrow, are all in straight lines; and the houses, contrary to what we meet with in the other towns of the empire, are lofty and regular. The bay, which is little better than a road, and is very much exposed when the wind is at north-west, is formed by a curve in the land, and a small island about a quarter of a mile from the shore.—Its entrance is defended by a fort well furnished with guns.

MOGULS, a celebrated nation of Asia, whose conquests formerly were the most rapid and extensive of any people recorded in history. They themselves deduce their origin from Japhet, or, as they call him, *Japhis*, the son of Noah. His son Turk, they say, was the first king, or khan, of those nations who are now known by the separate names of *Turks*, *Tartars*, and *Moguls*; and the Tartars especially, assert that their proper designation is *Turks*. To this prince is attributed many of those inventions which barbarous nations commonly ascribe to their first sovereigns. He was succeeded by Taunak; in whose reign the whole posterity of Turk were divided into four large tribes, denominated the *orda's* of Erlat, Gialair, Kaugin, Berlas or Perlas; of which last came the famous Timur Beg, or Tamerlane.—From this time to that of Alanza Khan, we meet with nothing remarkable. In his reign the Turks being immersed in all kinds of luxury, universally apostatized into idolatry. Having two sons, Tartar and Mogul, he divided his dominions among them, and thus gave rise to the two empires of the Tartars and Moguls.

The two nations had not long existed before they began to make war upon each other: and after long contention, the event at last was, that Il Khan, emperor of the Moguls, was totally overthrown by Siuntz Khan, emperor of the Tartars; and so great was the defeat, that the Mogul nation seems to have been almost exterminated. Only two of Il Khan's family survived this disaster. These were Kajan his youngest son, and Nagos his nephew, who were both of an age, and had both been married the same year. These two princes, with their wives, had been taken prisoners by Siuntz Khan, but found means to make their escape to their own country. Here they seized upon all the cattle which had not been carried off by the Tartars; which was easily done, as having none to dispute the property with them; then stripping some of the slain, they took their clothes, and retired into the mountains. They passed several mountains without much difficulty; but at last advanced to the foot of one exceedingly high, which had no way over it but a very small path made by certain animals, called in the Tartar language *archara*. This path they found themselves obliged to make use of, though it was so strait, that only one could pass at a time, and he was in the most imminent danger of breaking his neck at the least false step.

Having

Moguls

¹
Moguls descended from Japhet.

²
Almost exterminated.

Moguls.
3
They arrive in a delightful valley.

Having ascended the mountain on one side by this path, they descended by the same on the other side; and were agreeably surprised to find themselves in a most delightful track, interspersed with rivulets and charming meadows, abounding with a vast variety of delicious fruits, and inclosed on all sides by inaccessible mountains, in such a manner as to shelter them from all future pursuits of the Tartars. Here they lived some time, and gave this beautiful country the name of *Irgana-kon*, in allusion to its situation; *Irgana* signifying, in the old language of the Moguls, a "valley," and *Kon* a "steep height."

In process of time these two families very much increased. Kajan, whose posterity was the most numerous, called his descendants *Kajath*; but the people springing from Nagos were divided into two tribes; one of which received the appellation of *Nagosler*, and the other that of *Durlagan*.

These two Mogul princes and their descendants lived in this place for more than 400 years; but the latter then finding it too narrow for them, meditated a return to the country from which their forefathers had been driven. For some time, however, they found this impracticable, as the path that conducted their ancestors had been long since destroyed. At last they discovered, that one part of the high mountain above-mentioned was not very thick in a certain place; and also, that it consisted entirely of iron-ore. To this, having before set fire to a layer of wood, and another of charcoal, laid along the foot of the mountain, they applied 70 large bellows, and at last melted the mountain in such a manner, that an opening was made large enough for a loaded camel to pass; and through this passage they all marched out with great joy.

4
From whence they at last issue, and defeat the Tartars.

The Moguls having thus issued as it were from a new world, overthrew the Tartars in their turn; and continued to be a very considerable nation till the time of their great hero Temujin, afterwards called *Jenghiz Khan*, whom they extol in the most extravagant manner. It is difficult, however, to say, at the time Temujin made his appearance, how far the dominions of the Moguls extended, or in what estimation they were held by their neighbours. It seems to be pretty certain, that great part of the vast region now known by the name of *Tartary*, was then in a state of considerable civilization, and likewise extremely populous, as we find mention made of many cities which the Moguls destroyed; and the incredible multitudes whom they slaughtered, abundantly show the populousness of the country. On the east, the country of the Moguls and Tartars had the great desert which divides Tartary from China; on the west, it had the empire of Karazm, founded by Mahmud Gazni; and on the south were the countries now known by the name of *Indostan*, *Siam*, *Pegu*, *Tonquin*, and *Cochin-China*. Thus it comprehended the eastern part of modern Tartary, and all Siberia. This whole region was divided among a great number of *Aymacks*, or tribes; who had each one or more khans, according as it was more or less numerous, or divided into branches. Among these, that of the *Kara-its* was the most powerful: their prince assumed the title of *Grand Khan*, and among the rest the Moguls were tributary to him; but, according to the Chinese historians, both the one and the other were tributary to the emperor of Kitay or

5
State of Asia at the time of Jenghiz Khan.

Katay. China was divided into two parts: the nine southern provinces were in the hands of the Chinese emperors of the Song dynasty, who kept their court at Hang-chew, the capital of the province of Chekyang; the five northern provinces, excepting part of Shenfi, were possessed by the Kin, a people of Eastern Tartary, from whom are descended the Manchew Tartars, at present masters of China. This vast dominion was named *Kitay* or *Katay*, and was divided into two parts: that which belonged to China, was properly called *Kitay*; and the part which belonged to Tartary was called *Karakitay*, in which some even include the territories of the Moguls, Karaites, and other tribes, which are the subject of the present history. The western part of the empire of Kitay was possessed by a Turkish prince, who had lately founded a new kingdom there, called *Hya*; whose capital city was Hya-chew, now Ninghya in Shenfi, from whence the kingdom took its name. To the west of Hya lay Tangut; a country of great extent, and formerly very powerful; but at that time reduced to a low state, and divided among many princes; some of whom were subject to the emperor of Hya, and others to the emperor of China. All Tartary to the westward, as far as the Caspian sea, with the greater part of Little Buckharia, which then passed under the general name of *Turkestan*, was subject to Ghurkhan, Khurkhan, or Kavar Khan; to whom even the Gazni monarchs are said to have been tributary. This Ghurkhan had been prince of the Western Kitan or Lyau; who, driven out of Kitay by the king, settled in Little Buckharia, and the country to the north, where they founded a powerful state about the year 1124.

Moguls.

Thus the Moguls, properly so called, had but a very small extent of empire which could be called their own, if indeed they had any, when Temujin made his appearance. This hero is said by the Tartars to have been of divine origin, since his family could be traced no farther back than ten generations, the mother of whom was got with child by a spirit. The names and transactions of his predecessors are equally uncertain and unimportant: he himself, however, was born in the year 1163, and is said to have come into the world with congealed blood in his hands; from whence it was prognosticated that he would be a great warrior, and obtain the victory over all his enemies.

6
Descent and birth of Temujin.

This prediction, if any such there was, Temujin most literally fulfilled. At the time of his father's decease, his subjects amounted to between 30,000 and 40,000 families; but of these two thirds quickly deserted, and Temujin was left almost without subjects. When only 13 years of age, he fought a bloody battle against these revolvers; but either was defeated, or gained an indecisive victory; so that he remained in obscurity for 27 years longer. His good fortune at last he owed to the friendship of Vang Khan, who ruled over a great number of Tartar tribes to the north of Kitay, and has been heard of under the name of *Prefter John* among the Europeans. This prince took Temujin under his protection; and a rebellion being afterwards raised against himself, Temujin was made his general, and the khan was kept in possession of his throne; soon after which, Temujin subdued the tribes which had revolted from himself, treating them at the same time with the utmost barbarity.

7
Subdues his revolted subjects by means of Vang Khan.

Moguls.
8
Who be-
comes jea-
lous, and
contrives
his destruc-
tion.

This happened in the year 1201; but Vang Khan, instead of continuing the friend of Temujin, now became jealous, and resolved to destroy him by treachery. With this view he proposed a marriage between Temujin's son Juji and his own daughter, and another between Temujin's daughter and his own son. Temujin was invited to the camp of Vang Khan, in order to celebrate this double marriage; but, receiving intelligence of some evil intention against him, he excused himself to Vang Khan's messengers, and desired that the ceremony might be put off to some other time.

A few days after the departure of these messengers, Badu and Kishlik, two brothers, who kept the horses of one of Vang Khan's chief domestics, came and informed Temujin, that the grand Khan finding he had missed his aim, was resolved to set out instantly, and surprise him next morning, before he could suspect any danger. Temujin, alarmed at this intelligence, quitted his camp in the night-time, and retired with all his people to some distance. He was scarce gone when Vang Khan's troops arrived, and discharged an incredible number of arrows among the empty tents; but finding nobody there, they pursued Temujin in such haste that they fell into great disorder. In this condition they were suddenly attacked and routed by Temujin; after which an open war with Vang Khan took place.

9
Temujin
overcomes
all his ene-
mies.

By this quarrel almost all the princes of Tartary were put in motion, some siding with Temujin, and others with Vang Khan. But at last fortune declared in favour of the former: Vang Khan was overthrown in a battle, where he lost 40,000 men; and obliged to fly for refuge to a prince named *Tayyan Khan*, who was Temujin's father-in-law, and his own enemy, and by whom he was ungenerously put to death. Temujin immediately began to seize on his dominions, great part of which voluntarily submitted: but a confederacy was formed against him by a number of Vang Khan's tributaries, at the head of whom was Jamuka, a prince who had already distinguished himself by his enmity to Temujin; and even Tayyan Khan himself was drawn into the plot, through jealousy of his son-in-law's good fortune. But Temujin was well prepared; and in the year 1204 attacked Tayyan Khan, entirely routed his army, killed himself, and took Jamuka prisoner, whose head he caused instantly to be struck off; after which he marched against the other tribes who had conspired against him. Them he quickly reduced; took a city called *Kashin*, where he put all to the sword who had borne arms against him; and reduced all the Mogul tribes in 1205.

Temujin now, having none to oppose him, called a general diet, which he appointed to be held on the first day of the spring 1206; that is, on the day in which the sun entered Aries. To this diet were summoned all the great lords both Moguls and Tartars; and in the mean time, to establish good order in the army, he divided his soldiers into bodies of 10,000, 1000, 100, and 10 men, with their respective officers, all subordinate to the generals, or those who commanded the bodies of 10,000; and these were to act under his own sons. On the day of holding the diet, the princes of the blood and great lords appeared dressed in white. Temujin, dressed in the same manner, with his crown on his head, sat down on his throne, and

was complimented by the whole assembly, who wished him the continuance of his health and prosperity. After this they confirmed the Mogul empire to him and his successors, adding all those kingdoms which he had subdued, the descendants of whose vanquished khans were deprived of all right or title to them; and after this he was proclaimed emperor with much ceremony. During this inauguration, a pretended prophet declared that he came from God to tell the assembly, that from thenceforth Temujin should assume the name of *Jenghiz Khan*, or the *Most Great Khan of khans*; prophesying also, that all his posterity should be khans from generation to generation. This prophecy, which was no doubt owing to Temujin himself, had a surprising effect on his subjects, who from that time concluded that all the world belonged of right to them, and even thought it a crime against heaven for any body to pretend to resist them.

Jenghiz Khan having now reduced under his subjection all the wandering tribes of Moguls and Tartars, began to think of reducing those countries to the south and south west of his own, where the inhabitants were much more civilized than his own subjects; and the countries being full of fortified cities, he must of course expect to meet with more resistance. He began with the emperor of Hya, whose dominions he invaded in 1205, who at last submitted to become his tributary. But in the mean time Jenghiz Khan himself was supposed to be tributary to the emperor of Kitay; who, in 1210, sent him an officer, demanding the customary tribute. This was refused with the utmost indignation, and a war commenced, which ended not but with the dissolution of the empire of Kitay, as mentioned under the article CHINA.

In the year 1216, Jenghiz Khan resolved to carry his arms westward, and therefore left his general Muchuli to pursue his conquests in Kitay. In his journey westward he overthrew an army of 300,000 Tartars who had revolted against him; and, in 1218, sent ambassadors desiring an alliance with Mohammed Karazm Shah, emperor of Gazna. His ambassador was haughtily treated: however, the alliance was concluded; but soon after broken, through the treachery, as it is said, of the Karazmian monarch's subjects. This brought on a war attended with the most dreadful devastations, and which ended with the entire destruction of the empire of Karazm or Gazna, as related under the article GAZNA.

After the reduction of Karazm, part of the Moguls broke into Iran or Persia, where also they made large conquests, while others of their armies invaded Georgia and the countries to the west; all this time committing such enormities, that the Chinese historians say both men and spirits burst with indignation. In 1225, Jenghiz Khan returned to Hya, where he made war on the emperor for having sheltered some of his enemies. The event was, that the emperor was slain, and his kingdom conquered, or rather destroyed; which, however, was the last exploit of this most cruel conqueror, who died in 1227, as he marched to complete the destruction of the Chinese.

The Mogul empire, at the death of Jenghiz Khan, extended over a prodigious tract of country; being more than 1800 leagues in length from east to west, and upwards of 1000 in breadth from north to south.

Moguls.
10
Assumes
the title of
Jenghiz
Khan.

11
Invades
Hya, Chi-
na, &c.

12
Vast extent
of his em-
pire.
Its

¹² **Moguls.** Its princes, however, were still insatiable, and pushed on their conquests on all sides. Oktay was acknowledged emperor after Jenghiz Khan; and had under his immediate government Mogulestan (the country of the Moguls properly so called), Kitay, and the countries eastward to the Tartarian sea. Jagaty his brother governed under him a great part of the western conquests. The country of the Kipjacks, and others to the east and north-east, north and north-west, were governed by Batu or Patu the son of Juji, who had been killed in the wars; while Tuli or Toley, another son of Jenghiz Khan, had Khorassan, Persia, and what part of India was conquered. On the east side the Mogul arms were still attended with success; not only the empire of Kitay, but the southern part of CHINA, was conquered, as already related under that article, n^o 24-42. On the west side matters continued much in the same way till the year 1254, when Magu, or Menkho, the fourth khan of the Moguls, (the same who was afterwards killed at a siege in China*), raised a great army, which he gave to his brother Hulaku, or Hulagu, to extend his dominions westward. In 1255 he entered Iran, where he suppressed the Ismaelians or Assassins, of whom an account is given under the article ASSASSINS; and two years afterwards he advanced to Bagdad, which he took, and cruelly put the khalif to death, treating the city with no more lenity than the Moguls usually treated those which fell into their hands. Every thing was put to fire and sword; and in the city and its neighbourhood the number of slain, it is said, amounted to 1,600,000. The next year he invaded Syria; the city of Damascus was delivered up, and, as it made no resistance, the inhabitants were spared; but Aleppo being taken by storm, a greater slaughter ensued there than had taken place at Bagdad, not even the children in their cradles being spared. Some cities of this country revolted the next year, or the year after; but falling again into the hands of the Moguls, they were plundered, and the inhabitants butchered without mercy, or carried into slavery.

* See China,
n^o 38.

¹³
Bagdad re-
duced.

¹⁴
It begins to
decline.

Hulaku died in 1264, and at his death we may fix the greatest extent of the Mogul empire. It now comprehended the whole of the continent of Asia, excepting part of Indostan, Siam, Pegu, Cochinchina, and a few of the countries of Lesser Asia, which had not been attacked by them; and during all these vast conquests no Mogul army had ever been conquered, except one by Jaloloddin, as mentioned under the article GAZNA.—From this period, however, the empire began to decline. The ambition of the khans having prompted them to invade the kingdoms of Japan and Cochinchina, they were miserably disappointed in their attempts, and lost a great number of men. The same bad success attended them in Indostan; and in a short time this mighty empire broke into several smaller ones. The governors of Persia being of the family of Jenghiz Khan, owned no allegiance to any superior; those of Tartary did the same. The Chinese threw off the yoke; and thus the continent of Asia wore much the same face that it had done before Jenghiz Khan began his conquests.

The successors of Hulaku reigned in Persia till the year 1335; but that year Abusaid Khan, the eighth from Hulaku, dying, the affairs of that country fell

into confusion for want of a prince of the race of ¹⁵ **Moguls.** Jenghiz Khan to succeed to the throne. The empire, therefore, was divided among a great number of petty princes, who fought against each other almost without intermission, till, in the year 1369, Timur Bek, or Tamerlane, one of these princes, having conquered a number of others, was crowned at Balkh, with the pompous title of *Sahab Karan*; that is, “the emperor of the age, and conqueror of the world.” As he had just before taken that city, and destroyed one of his most formidable rivals who had shut himself up in it, the new emperor began his reign with beheading some of the inhabitants, imprisoning others, burning their houses, and selling the women and children for slaves. In 1370 he crossed the Sihun, made war on the Getes, and attacked Karazm. Next year he granted a peace to his enemies; but two years after, he again invaded the country of the Getes, and by the year 1379 had fully conquered that country as well as Korazan; and from that time he continued to extend his conquests in much the same manner as Jenghiz Khan had done, though with less cruelty.—In 1387 he had reduced Armenia, Georgia, and all Persia; the conquest of which last was completed by the reduction of Ispahan, 70,000 of the inhabitants of which were slaughtered on account of a sedition raised by some rash or evil disposed persons.

¹⁵
Tamerlane
crowned
emperor of
Balkh.

¹⁶
Becomes a
great con-
queror.

After the reduction of Persia, Timur turned his arms northward and westward, subduing all the countries to the Euphrates. He took the city of Bagdad; subdued Syria; and having ravaged great part of Russia, returned to Persia in 1396, where he splendidly feasted his whole army. In 1398 he invaded Indostan, crossed the Indus on the 17th of September, reduced several fortresses, and made a vast number of captives. However, as he was afraid that, in case of any emergency, these prisoners might take part with the enemy, he gave orders to his soldiers to put all their Indian slaves to death; and, in consequence of this inhuman order, more than 100,000 of these poor wretches were slaughtered in less than an hour.

¹⁷
Invades and
conquers
Indostan.

In the beginning of the year 1399, Timur was met by the Indian army; whom, after a desperate battle, he defeated with great slaughter, and soon after took the city of Dehli, the capital of the country. Here he seated himself on the throne of the Indian emperors, and here the sharifs, kadis, and principal inhabitants of the city, came to make their submission, and begged for mercy. The tame elephants and rhinoceroses likewise were brought to kneel before him as they had been accustomed to do to the Indian emperors, and made a great cry as if they implored his clemency. These war-elephants, 120 in number, were, at his return, sent to Samarcand, and to the province where his sons resided. After this, at the request of the lords of the court, Timur made a great feast; at which he distributed presents to the princes and principal officers.

Dehli at this time consisted of three cities, called ¹⁸ *Seyri*, *Old Dehli*, and *Jehan Penab*. *Seyri* was surrounded with a wall in form of a circle. *Old Dehli* was the same, but much larger, lying south-west of the other. These two parts were joined on each side by a wall; and the third, lying between them, was called *Jehan Penab*, which was larger than *Old Dehli*.

¹⁸
The city of
Dehli de-
stroyed,
and the in-
habitants
slaughtered.

Penab

Moguls.

nah had ten gates; Seyri had seven, three of which looked towards Jehan Penah; this last had thirteen gates, six to the north-west, and seven to the south-east. Every thing seemed to be in a quiet posture; when, on the 12th of January 1399, the soldiers of Timur being assembled at one of the gates of Dehli, insulted the inhabitants of the suburbs. The great emirs were ordered to put a stop to these disorders; but their endeavours were not effectual. The sultanas having a curiosity to see the rarities of Dehli, and particularly a famous palace adorned with 1000 pillars, built by an ancient king of India, went in with all the court; and the gate being on that occasion left open for every body, above 15,000 soldiers got in unperceived. But there was a far greater number of troops in a large place between Dehli, Seyri, and Jehan Penah, who committed great disorders in the two last cities. This made the inhabitants in despair fall on them; and many, setting fire to their houses, burnt their wives and children. The soldiers seeing this confusion, did nothing but pillage the houses; while the disorder was increased by the admission of more troops, who seized the inhabitants of the neighbouring places who had fled thither for shelter. The emirs, to put a stop to this mischief, caused the gates to be shut: but they were quickly opened by the soldiers within, who rose in arms against their officers; so that by the morning of the 13th the whole army was entered, and this great city was totally destroyed. Some soldiers carried out 150 slaves, men, women, and children; nay, some of their boys had 20 slaves a-piece to their share. The other spoils, in jewels, plate, and manufactures, were immense; for the Indian women and girls were adorned with precious stones, and had bracelets and rings on their hands, feet, and even toes, so that the soldiers were loaded with them. On the 15th, in Old Dehli, the Indians retired into the great mosque to defend themselves; but being attacked by the Tartars, they were all slaughtered, and towers erected with their heads. A dreadful carnage now ensued throughout the whole city, and several days were employed before the inhabitants could be made to quit it entirely; and as they went, the emirs took a number of them for their service. The artisans were also distributed among the princes and commanders; all but the masons, who were reserved for the emperor, in order to build him a spacious stone-mosque at Samarcand.

After this terrible devastation, Timur marched into the different provinces of Indostan, every where defeating the Indians who opposed him, and slaughtering the Ghebrs or worshippers of fire. On the 25th of March he set out on his return, and on the 9th of May arrived at Samarcand. In a few months after his arrival, he was obliged to undertake an expedition into Persia, where affairs were in the utmost disorder on account of the misconduct of his son, whom he had appointed sovereign of that empire. Here Timur soon settled matters; after which he again set out on an expedition westward, reduced many places in Georgia which had not submitted before, and invaded and conquered Syria. At the same time he quarrelled with Bajazet the Turkish sultan, then busied in an enterprise against Constantinople, in which he would probably have succeeded had not Timur interposed.

19
Timur
quarrels
with Baza-
ret the
Turkish sul-
tan.

The cause of this quarrel at first was, that Bajazet had demanded tribute from a prince who was under Timur's protection, and is said to have returned an insulting answer to the Tartar ambassadors who were sent to him on that account. Timur, however, who was an enthusiast in the cause of Mahometanism, and considered Bajazet as engaged in the cause of heaven when besieging a Christian city, was very unwilling to disturb him in so pious a work; and therefore undertook several expeditions against the princes of Syria and Georgia, in order to give the Turkish monarch time to cool and return to reason. Among other places, he again invested the city of Bagdad, which had cast off its allegiance to him; and having taken it by storm, made such a dreadful massacre of the inhabitants, that 120 towers were erected with the heads of the slain. In the mean time Bajazet continued to give fresh provocation, by protecting one Kara Yusef a robber, who had even insulted the caravan of Mecca; so that Timur at length resolved to make war upon him. The sultan, however, foreseeing the danger of bringing such a formidable enemy against himself, thought proper to ask pardon, by a letter, for what was past, and promise obedience to Timur's will for the future. This embassy was graciously received; and Timur returned for answer, that he would forbear hostilities, provided Bajazet would either put Kara Yusef to death, send him to the Tartar camp, or expel him out of his dominions. Along with the Turkish ambassadors he sent one of his own; telling Bajazet that he would march into the confines of Anatolia, and there wait his final answer.

Though Bajazet had seemed at first willing to come to an agreement with Timur, and to dread his superior power; yet he now behaved in such an unsatisfactory manner, that the Tartar monarch desired him to prepare for war; upon which he raised the siege of Constantinople, and having met Timur with an army greatly inferior to the Tartars, was utterly defeated and taken prisoner. According to some accounts, he was treated with great humanity and honour; while others inform us, that he was shut up in an iron cage, against which he dashed out his brains the following year. At any rate, it is certain that he was not restored to liberty, but died in confinement.

This victory was followed by the submission of many places of the Lesser Asia to Timur; the Greek emperor owned himself his tributary, as did also the sultan of Egypt. After this, Timur once more returned to Georgia, which he cruelly ravaged; after which he marched to Samarcand, where he arrived in the year 1405. Here, being now an old man, this mighty conqueror began to look forward to that state which at one time or other is the dread of all living creatures; and Timur, in order to quiet the remorses of his own conscience, came to the following curious resolution, which he communicated to his intimate friends; namely, that "as the vast conquests he had made were not obtained without *some violence*, which had occasioned the destruction of a great number of God's creatures, he was resolved, by way of atonement for his past crimes, to perform some good action; namely, to make war on the infidels, and exterminate the idolaters of China." This atonement, however, he did not live to accomplish; for he died the same

20
Bajazet de-
feated and
taken pri-
soner.

21
Death of
Tamerlane,
and dissolu-
tion of his
empire.

year

Moguls. year of a burning fever, in the 71st year of his age and 36th of his reign.

On the death of Timur, his empire fell immediately into great disorder, and the civil wars continued for five or six years; but at last peace was restored, by the settlement of Shah Rukh, Timur's son, on the throne. He did not, however, enjoy the empire in its full extent, or indeed much above one half of it; having only Karazm, Khorassan, Kandahar, Persia, and part of Indostan. Neither was he able, though a brave and warlike prince, to extend his dominions, though he transmitted them to his son Ulug Beg. He proved a wise and learned monarch; and is famous for the astronomical tables which he caused to be composed, and which are well known at this day. He was killed in 1448 by his son Abdollatif, who six months after was put to death by his own soldiers. After the death of Abdollatif, Abdollah, a grandson of Shah Rukh, seized the throne; but, after reigning one year, was expelled by Abusaid Mirza, the grandson of Miran Shah the son of Timur. His reign was one continued scene of wars and tumults; till at last he was defeated and taken prisoner by one Hassan Beg, who put him to death in 1468. From this time we may look upon the empire of Timur as entirely dissolved, though his descendants still reigned in Persia and Indostan, the latter of which is still known by the name of the *Mogul's empire*.

22
History of
Indostan.

On the death of the above mentioned monarch, his son Babr or Babor succeeded him, but was soon driven out by the Usbeck Tartars; after which he resided some time in Gazna, whence he made incursions into Hindostan, and at length became master of the whole empire, excepting the kingdoms of Dekan, Guzerat, and Bengal.—For the transactions subsequent to this period, see the articles HINDOSTAN and INDIA. What remains to be supplied here is an account of the revolution that has lately happened at Delhi the capital of the Mogul empire.

Gholam Khadur, author of the revolution, was the son of Zabda Khan. His father disinherited him, and drove him from his presence on account of his vices and his crimes. Shah Allum, the king of Delhi, took him under his protection, treated him as his own son, and conferred on him the first title in the kingdom, *Amere ul Omraow*. He lived with the king, and raised a body of about 8000 troops of his own countrymen the Moguls, which he commanded. Gholam Khadur was of a passionate temper, haughty, cruel, ungrateful, and debauched. In the latter end of the year 1788, the king had formed suspicions that some of the neighbouring rajahs (princes) would make an attempt to plunder and destroy his territories. These suspicions were verified by the approach of a considerable army towards his capital, commanded by Ismael Beg Khan, and assisted by Scindia. Gholam Khadur told the king on this, that he had nothing to fear; for that he had an army sufficiently strong to oppose the enemy: that all the king had to do was to march out with his troops, give them a supply of cash, and he would lay his head on the enemy's being overcome. The king on this replied, that he had no money to carry on a contest. Gholam Khadur said, that this objection would soon be obviated, as he (Gholam Khadur)

would advance the necessary supply of cash, and that all his majesty had to do was to head the army. "This (said he) will animate them and give them confidence; the presence of a monarch is above half the battle." The king agreed in appearance, and requested Gholam Khadur to assemble the army, pay their arrears, and inform them of his intentions. Gholam Khadur retired contented: but great was his astonishment, when he intercepted the next day a letter from the king to Scindia, desiring him to make as much haste as possible, and destroy Gholam Khadur; for, says he, Khadur wishes me to act contrary to my wishes, and oppose you. On this discovery, Gholam Khadur marched out with his Moguls, crossed the Jumna, and encamped on the other side opposite the fort of Delhi. He sent to the king the intercepted letter, and asked him if his conduct did not deserve to be punished by the loss of his throne?—He began to besiege the fort, and carried it in a few days. He entered the palace in arms; flew to the king's chamber; insulted the old man in the most barbarous manner; knocked him down; and, kneeling on his breast, with his knife took out one of his eyes, and he ordered a servant of the king's to take out the other.

After this he gave up the palace to pillage, and went to the king's *zazana* (the residence of his women); where he insulted the ladies, and tore their jewels from their noses and ears and off their arms and legs. As he had lived with the king, he was well acquainted with the different places where the king's treasures were hid; he dug up the floor of the king's own bed-room, and found there two chests, containing in specie 120,000 gold mohurs, or L. 192,000 sterling; this he took, and vast sums more. To get at the hidden jewels of the women, he practised one of the most villainous schemes that ever was thought of. The third day after these horrid cruelties, he ordered that all the king's ladies and daughters should come and pay their respects to him, and promised to set those free who could please him by their appearance and dress. The innocent, unthinking women, brought out their jewels, and adorned themselves in their richest attires to please this savage. Gholam Khadur commanded them to be conveyed into a hall, where he had prepared common dresses for them; these dresses he made them put on by the assistance of eunuchs; and taking possession of their rich dresses and jewels, sent the women home to the palace to lament their loss and curse his treachery. Gholam Khadur did not even stop here; but insulted the princes, by making them dance and sing. The most beautiful of the king's daughters, Mobaruck ul Moulk, was brought to this tyrant to gratify his lust: but she resisted, and is said to have stabbed herself in order to avoid force.

Scindia soon after this came to the assistance of the king, rather to make him his prey. Gholam Khadur fled and took refuge in the fort of Agra, a large city about 150 miles from Delhi. Scindia's troops besieged him there. Perceiving at last that he must be taken if he continued in the fort, he took the advantage of a dark night, stuffed his saddle with a large flock of precious stones, took a few followers, and fled from the fort towards Persia. Unluckily for him, he fell off his horse the second night after his flight; by this

Mohair
||
Moine.

this means a party of horse which had been sent in pursuit of him came up with him, and took him prisoner. He was brought to Scindia; who, after exposing him for some time in irons, and some time in a cage, ordered his ears, his nose, his hands, and his feet, to be cut off, and his eyes taken out; in which state he was allowed to expire.

Scindia has rewarded himself by seizing upon the kingdom which he came to guard: And all that now belongs to Shah Allum, the nominal emperor, is the city of Delhi, with a small district around it, where, even deprived of fight, he remains an empty shadow of royalty; an instance of the instability of human greatness, and of the precarious state of despotic governments.

MOHAIR, in commerce, the hair of a kind of goat frequent about Angria in Turkey; the inhabitants of which city are all employed in the manufacture of camblets made of this hair.

Some give the name *mohair* to the camblets or stuffs made of this hair: of these there are two kinds; the one smooth and plain, the other watered like tabbies, the difference between the two only consists in this, that the latter is calendered, the other not. There are also mohairs both plain and watered, whose woof is of wool, cotton, or thread.

MOHAIR-Shell, in conchyliology, a name given to a peculiar species of voluta, which seems of a closely and finely reticulated texture, and resembles on the surface a piece of mohair or a very close silk-worm's web.

MOHAWKS. See MUCK.

MOHAWK Country, a part of North America, inhabited by one of the five nations of the Iroquois, situated between the province of New York and the lake Ontario or Frontignac.

MOHILA, or MOELIA, one of the Comorra islands in the Indian sea, between the north end of the island of Madagascar and the continent of Africa. The inland parts are mountainous and woody; but the lands adjoining to the sea are watered by several fine streams which descend from the mountains; and the grass is green all the year, so that it affords a most delightful habitation. There are plenty of provisions of all kinds; and the East India ships of different nations sometimes touch here for refreshment.

MOHILOF, a large and strong city of Poland, in the province of Lithuania, and palatinate of Mscislau. It is well built, populous, and has a considerable trade. Near this place the Swedes obtained a great victory over the Russians in 1707.

MOIDORE, a Portuguese gold coin, value 1 l. 7 s. Sterling.

MOIETY (*Medietas*), the half of any thing.

MOINE (Peter le), was born at Chaumont in Bassigni, A. D. 1602, and died at Paris August 22. 1672, aged 70. He joined the society of Jesuits, and enjoyed several offices among them. He is chiefly known by his verses, which were collected into one volume folio in 1671. Father le Moine is the first of the French poets belonging to that famous society, who acquired reputation by this species of writing. It cannot be denied that this poet possessed genius and fancy; but his imagination was ungoverned, which is particularly the case in his poem of *Saint Louis*. De-
N° 225.

spreaux, when asked his opinion of this poet, replied, That "he was too extravagant for praise, and too much a poet for censure." To give his character in one word, he was a pedant who had a lively imagination without taste, and who, far from restraining his impetuous genius, abandoned himself without reserve to its direction. Hence his gigantic figures, his crowd of metaphors, his ridiculous antitheses, his hyperbolical expressions, &c. This Jesuit somewhere says, "that the water of the river on the banks of which he had composed his verses, was so admirably qualified to make poets, that though it were converted into holy water, it would not protect a man against the dæmon of poetry." The prose of father le Moine is in the same brilliant and bombast style. Senault, a father of the oratory, used to say of him, that he was Balzac in a theatrical dress. Among his prose works are, 1. *La Devotion aisée*, Paris, 1652, 8vo; an extraordinary book which produced more mirth than devotion. 2. *Pensées Morales*. On these two books the reader may consult Paschal's ninth and tenth provincial letters. 3. A short Treatise on History, in 12mo; in which we find many pleasant and curious thoughts mixed with a good deal of common-place.

MOINE (Stephen le), a very learned French minister of the Protestant religion, was born at Caen in 1624. He became extremely skilled in the Greek, Latin, and Oriental tongues, and professed divinity with high reputation at Leyden, in which city he died in 1689. Several dissertations of his are printed together, and intitled *Varia Sacra*, in 2 vols 4to; besides which, he wrote other works.

MOINE (Francis le), an excellent French painter, was born at Paris in 1688, and trained up under Galloche professor of the academy of painting; which office he himself afterwards filled. Le Moine painted the grand saloon which is at the entrance into the apartments of Versailles, and which represents the apotheosis of Hercules. He was four years about it; and the king, to show how well pleased he was with it, made him his first painter in 1736, and gave him a pension of 4000 livres. A fit of lunacy seized this painter the year after; during which he run himself through with his sword, and died, June 4. 1737, aged 49.

MOIRA (sometimes written *Moyra*), a town of Ireland, situated in the county of Down and province of Ulster, 69 miles from Dublin; noted for its linen manufacture, and a monthly market for vending the same. It gives title of earl to the family of Rawdon. Lord Moira has here a very beautiful seat; and here is a handsome church, a charity school, and two dissenting meeting-houses.

MOISTURE. See HUMIDITY.

The moisture of the air has considerable effects on the human body. For the quantity and quality of the food, and the proportion of the meat to the drink, being given, the weight of a human body is less, and consequently its discharges greater in dry weather than in wet weather; which may be thus accounted for: the moisture of the air moistens the fibres of the skin and lessens perspiration by lessening their vibratory motion. When perspiration is thus lessened by the moisture of the air, urine indeed is by degrees increased,

Moine
||
Moisture.

Moivre. increased, but not equally. Hence, according to Dr Bryan Robinson, we learn, that to keep a body of the same weight in wet weather as in dry, either the quantity of food must be lessened, or the proportion of the meat to the drink increased; and both these may be done by lessening the drink without making any change in the meat.

The instrument used for determining the degree of moisture in the air, is called an *hygrometer*. See *HYGROMETER*.

MOIVRE (Abraham), was born at Vitri in Champagne, A. D. 1667. His father was a surgeon. At the revocation of the edict of Nantes, he determined to fly into England rather than abandon the religion of his fathers. Before he left France, he had begun the study of Mathematics; and having perfected himself in that science in London, he was obliged, by the meanness of his circumstances, to teach it. Newton's *Principia*, which accidentally fell into his hands, showed him how little progress he had made in a science of which he thought himself master. From this work he acquired a knowledge of the geometry of infinites with as great facility as he had learned the elementary geometry; and in a short time he was fit to be ranked with the most celebrated mathematicians. His success in these studies procured him a seat in the Royal Society of London and in the Academy of Sciences at Paris. His merit was so well understood in the former, that he was thought capable of deciding in the famous dispute between Leibnitz and Newton concerning the differential calculus. —He published a *Treatise on Chances* in 1738, and another on annuities in 1752; both extremely accurate. The *Philosophical Transactions* contain many interesting memoirs of his composition. —Some of them treat of the method of fluxions; others are on the lunula of Hippocrates; others on physical astronomy, in which he resolved many important problems; and others, in short, on the analysis of the games of chance, in which he followed a different course from that of Montmort. Towards the close of his life he lost his sight and hearing; and the demand for sleep became so great that he required 20 hours of it in a day. He died at London, 1754, aged 87. His knowledge was not confined to mathematics; but he retained to the last a taste for polite literature. He was intimately acquainted with the best authors of antiquity; and he was frequently consulted about difficult passages in their works. Rabelais and Moliere were his favourite French authors; he had them by heart; and he one day observed to one of his acquaintance, "that he would rather have been Moliere than Newton." He recited whole scenes of the *Misanthrope* with that delicacy and force with which he remembered to have heard them recited at Paris 70 years before, by Moliere's own company. The character indeed was somewhat similar to his own. He judged severely of mankind; and could never conceal his disgust at the conversation of a fool, nor his aversion to cunning and dissimulation. He was free from the affectation of science; and no one could know him to be a mathematician but from the accuracy of his thoughts. His conversation was general and instructive. Whatever he said was well digested and clearly expressed. His style possessed more strength

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and solidity than ornament and animation; but he was always correct, and he bestowed as much pains on his sentences as on his calculations. He could never endure any bold assertions or indecent witticisms against religion. "I show you that I am a Christian (said he one day to a person who thought to pay him a compliment by observing that mathematicians were attached to no religion), by forgiving the speech you have now made." The practice of giving vails to servants was not laid aside in his time; and, on this account, when a nobleman asked him why he did not dine oftener with him? "You must excuse me, my lord (replied he), I cannot afford it."

MOLA (Pietro Francesco), an eminent painter, was born, according to most authors, at Lugano, a city belonging to the Switzers, in the year 1609. Others affirm, that the place of his birth was Coldra, in the district of Como. He was at first the disciple of Giuseppe d'Arpino, and afterwards of Albano. When he quitted the school of the latter, he went to Venice, and studied assiduously the pictures of Tintin, Tintoretto, Bassan, and Paolo Veronese. He painted historical subjects and landscapes with great success; but his genius seemed more particularly adapted to the latter. His pictures, in both styles, are spoken of with the warmest commendations. He died in 1665.—He had a brother, *Giovanni Batista*, who was also a painter, and of some merit, but very inferior to that of the older.

MOLA, an ancient town of Italy, in the kingdom of Naples, and in the Terra di Lavoro, where they pretend to show the ruins of Cicero's house. It is seated on the gulf of Venice, in E. Long. 17. 50. N. Lat. 41. 5.

MOLA Salsa, (*Salt Cake*), in antiquity, was barley parched, and afterwards ground to meal or flour, then mixed with salt and frankincense, with the addition of a little water. Thus prepared, it was sprinkled between the horns of the victim before it was killed in sacrifice. This act was called *immolatio*, and was common to the Greeks as well as Romans; with this difference, that the *mola* of the Romans was of wheat. The Greeks called it *μολα* or *μολαχύν*.

MOLARES, or **DENTES MOLARES**, in anatomy, the large teeth, called in English the *grinders*. See *ANATOMY*, n° 27.

MOLASSES, or **MOLOSSES**. See *MOLOSSES*.

MOLDAVIA, a province of Turkey in Europe, bounded on the north-east by the river Niefter, which divides it from Poland; on the east, by Bessarabia; on the south by the Danube, which parts it from Bulgaria; and on the west, by Walachia and Transilvania; it being 240 miles in length and 150 in breadth. It lies in a good air and fruitful soil, producing corn, wine, rich pastures, a good breed of horses, oxen, sheep, plenty of game, fish, fowl, honey, wax, and all European fruits. Its principal rivers are the Danube, Niefter, Pruth, Bardalach, and Ceret. The inhabitants are Christians of the Greek church, and Jassy is the principal town. It has been tributary to the Turks ever since the year 1574; who appoint a prince who is a native of the country, but have no regard to his being of the principal families. They pay a large yearly tribute; besides which, they are obliged to raise a great body of horse at their own expence.

C c

MOLE,

Mola
||
Moldavia.

Mole.

MOLE, a river in Surry, which has taken its name from running under ground. It first disappears at Box-hill, near Dorking, in the county of Surry, and emerges again near Leatherhead.

MOLE, in zoology. See **TALPA**.

Moles in the fields may be destroyed by taking a head or two of garlic, onion, or leek, and putting it into their holes; on which they will run out as if frightened, and you may kill them with a spear or dog. Or pounded hellebore, white or black, with wheat-flour, the white of an egg, milk, and sweet-wine, or metheglin, may be made into a paste, and pellets as big as a small nut may be put into their holes: the moles will eat this with pleasure, and will be killed by it. In places where you would not dig nor break much, the fuming their holes with brimstone, garlic, or other unfavourable things, drives them away; and if you put a dead mole into a common haunt, it will make them absolutely forsake it.

Or take a mole-spear or staff, and where you see them cast, go lightly; but not on the side betwixt them and the wind, lest they perceive you; and at the first or second putting up of the earth, strike them with your mole-staff downright, and mark which way the earth falls most: if she casts towards the left hand, strike somewhat on the right hand; and so on the contrary, to the casting up of the plain ground, strike down, and there let it remain; then take out the tongue in the staff, and with the spattle, or flat edge, dig round about your grain to the end thereof, to see if you have killed her; and if you have missed her, leave open the hole and step aside a little, and perhaps she will come to stop the hole again, for they love but very little air; and then strike her again; but if you miss her, pour into the hole two gallons of water, and that will make her to come out for fear of drowning: mind them going out of a morning to feed, or coming home when fed, and you may take a great many.

MOLE, in midwifery, a mass of fleshy matter, of a spherical figure, generated in the uterus, and sometimes mistaken for a child. See **MIDWIFERY**.

MOLE, or *Mark*. See **NÆVUS**.

MOLE, in architecture, a massive work formed of large stones laid in the sea by means of coffer dams, extended either in a right line or an arch of a circle, before a port, which it serves to close; to defend the vessels in it from the impetuosity of the waves, and to prevent the passage of ships without leave. Thus we say the mole of the harbour of Messina, &c.

MOLE is sometimes also used to signify the harbour itself.

MOLE, (*moles*), among the Romans, was also used for a kind of mausoleum, built in manner of a round tower on a square base, insulate, encompassed with columns, and covered with a dome.—The mole of the emperor Adrian, now the castle of St Angelo, was the greatest and most stately of all the moles. It was crowned with a brazen pine-apple, wherein was a golden urn containing the ashes of the emperor.

MOLE Cricket, in zoology. See **GRYLLOTALPA**.

MOLE-HILLS. These little hillocks of earth are a very great prejudice to the pasture-lands, not only in wasting so much of the land as they cover, but in

hindering the scythe in mowing. In the west of England they use a peculiar instrument for the breaking up of these; it is a flat board, very thick, and of about eight inches in diameter, into which there is fastened a perpendicular handle of three or four feet long. It has four broad and sharp iron teeth at the front, which readily cut through the hill, and spread the earth it consists of; and behind there is a large knob proper for breaking the clods with, if there are any. Some use a spade, or other common instrument, in the place of this, but not so well. There is, however, a much better instrument even than this, for destroying these hills, where they are in very great numbers. This is a kind of horse-machine; it has a sharp iron about three feet over, and with a strong back.—It is about four or five inches broad, and has two long handles for a horse to be harnessed to, and a cross bar of iron to strengthen it at the bottom of the handles, reaching from the one handle to the other. The middle of this cross-bar is furnished with one, two, or more sharp pieces of iron like small plough-shares, to cut the mole-hills into two, three, or more parts. The iron behind is of a semicircular figure. A single horse is harnessed to this machine, and a boy must be employed to drive it, and a man to hold and guide it; the sharp irons or shares are the first things that meet the hill, they run through it, break its texture, and cut it into several parts; and the circular iron following immediately behind them, cuts up the whole by the roots, and leaves the land level. This instrument will destroy as many mole-hills in one day as a common labourer can in eight, and would be of very great advantage to the kingdom if brought into general use. It is to be observed, that this leaving a naked space in the place of every hill, it will be necessary to go over the land, and sow them with hay seed, otherwise these spots will want the produce of grass the first years. The farmers in some parts of England are not willing to destroy the mole-hills, but let them stand from year to year, supposing that they get some ground by them, but the advantage by this means is so little, that it does not balance the unsightliness and damage to the mowing.

MOLESWORTH (Robert), Viscount Molesworth, an eminent statesman and polite writer, born at Dublin in 1656, where his father was a merchant. He was attainted by King James for his activity on the prince of Orange's invasion; but the latter, when he was settled on the throne, called up Mr Molesworth into the privy-council, and sent him envoy-extraordinary to the court of Denmark. Here he resided above three years, and then returned upon some disgust, without an audience of leave. Upon his return, he drew up his Account of Denmark, a work well known, in which he represented that government as arbitrary; and hence gave great offence to George prince of Denmark. The Danish envoy presented a memorial to King William concerning it; and then furnished materials for an answer, which was executed by Dr William King. Mr Molesworth was member of the houses of commons in both kingdoms: King George I. made him a commissioner of trade and plantations, and advanced him to the peerage of Ireland, by the title of *Baron Philipstown*, and *Viscount Molesworth of Swords*.

Mole,
Molef-
worth.

Moliere *Swords.* He died in 1725. Besides his Account of Denmark, he wrote an address to the house of commons, for the encouragement of agriculture; and translated Franco Gallia, a Latin treatise of the civilian Hottoman, giving an account of the free state of France, and other parts of Europe, before the encroachments made on their liberties.

MOLIERE (John Baptist), a famous French comedian, whose true name was *Pocquelin*, which for some reason or other he sunk for that of Moliere. He was the son of a valet de chambre, and was born at Paris about the year 1620. He went through the study of the classics under the Jesuits in the college of Clermont, and was designed for the bar; but at his quitting the law-schools, he made choice of the actor's profession. From the prodigious fondness he had for the drama, his whole study and application being directed to the stage, he continued till his death to exhibit plays, which were greatly applauded. It is said the first motive of his going upon the stage was to enjoy the company of an actress for whom he had contracted a violent fondness. His comedies are highly esteemed. And it is no wonder he so justly represented domestic feuds, and the torments of jealous husbands, or of those who have reason to be so, it being asserted that no man ever experienced all this more than Moliere, who was very unhappy in his wife. His last comedy was *La Malade imaginaire*, which was brought on the stage in 1673; and Moliere died on the fourth night of its representation; some say in acting the very part of the pretended dead man, which gave some exercise for the wits of the time; but according to others he died in his bed that night, from the bursting of a vein in his lungs by coughing. The king, as a last mark of his favour, prevailed with the archbishop of Paris to suffer him to be buried in consecrated ground; though he had irritated the clergy by his *Tartuff*. The most esteemed editions of his works are that of Amsterdam, 5 vols 12mo, 1699; and that of Paris, 6 vols 4to, 1734.

MOLINA (Lewis), a Spanish lawyer, who was employed by Philip II. king of Spain in the councils of the Indies and of Castile. He is the author of a learned treatise concerning the entails of the ancient estates of the Spanish nobility, entitled, *De Hispanorum Primogenitorum Origine et Natura*, published in 1603, in folio. This book is likewise applicable to several provinces in France. Lewis Molina must not be confounded with John Molina, a Spanish historian, author of *Cronica antiqua d' Aragon*, published in 1524, in folio; and also of *De las Casas memorables d' España*, in folio. The first work appeared at Valencia, and the second at Alcalá.

MOLINÆUS. See MOULIN.

MOLINISTS, in ecclesiastical history, a sect in the Romish church, who follow the doctrine and sentiments of the Jesuit Molina, relating to sufficient and efficacious grace. He taught that the operations of divine grace were entirely consistent with the freedom of human will; and he introduced a new kind of hypothesis to remove the difficulties attending the doctrines of predestination and liberty, and to reconcile the jarring opinions of Augustines, Thomists, Semi-Pelagians, and other contentious divines. He affirmed, that the decree of predestination to eternal glory was

founded upon a previous knowledge and consideration of the merits of the elect; that the grace, from whose operation these merits are derived, is not efficacious by its own intrinsic power only, but also by the consent of our own will, and because it is administered in those circumstances, in which the Deity, by that branch of his knowledge which is called *scientia media*, foresees that it will be efficacious. The kind of prescience, denominated in the schools *scientia media*, is that foreknowledge of future contingents that arises from an acquaintance with the nature and faculties of rational beings, of the circumstances in which they shall be placed, of the objects that shall be presented to them, and of the influence which their circumstances and objects must have on their actions.

MOLINOS (Michael), a Spanish priest, who endeavoured to spread new doctrines in Italy. He was born in the diocese of Saragossa in 1627; and entered into priest's orders, though he never held any ecclesiastical benefice. He was a man of good sense and learning, and his life was exemplary; though, instead of practising austerities, he gave himself up to contemplation and mystical devotion. He wrote a book intitled, *Il Guida Spirituale*, containing his peculiar notions, which was greedily read both in Italy and Spain. His followers are called *Quietists*; because his chief principle was, that men ought to annihilate themselves in order to be united to God, and afterwards remain in quietness of mind, without being troubled for what shall happen to the body. He was taken up in 1687; and his 68 propositions were examined by the pope and inquisitors, who decreed that his doctrine was false and pernicious, and that his books should be burned. He was forced to recant his errors publicly in the Dominicans church, and was condemned to perpetual imprisonment. He was 60 years old when he was taken, and had been spreading his doctrine 22 years before. He died in prison in 1692.

MOLINOSISTS, a sect among the Romanists, who adhere to the doctrine of Molinos. These are the same with what are otherwise called *Quietists*.

MOLLOY (Charles, Esq;), descended from a good family in the kingdom of Ireland, was born in the city of Dublin, and received part of his education at Trinity college there, of which he afterwards became a fellow. At his first coming to England he entered himself of the Middle Temple, and was supposed to have had a very considerable hand in the writing of a periodical paper called "Fog's Journal;" as also since that time to have been almost the sole author of another well-known paper, intitled "Common Sense." All these papers give testimony of strong abilities, great depth of understanding, and clearness of reasoning. Dr King was a considerable writer in the latter, as were lords Chesterfield and Lyttleton. Our author had large offers made him to write in defence of Sir Richard Walpole, but these he rejected; notwithstanding which, at the great change in the ministry in 1742, he was entirely neglected, as well as his fellow-labourer Amherst, who conducted "The Craftsman." Mr Molloy, however, having married a lady of fortune, was in circumstances which enabled him to treat the ingratitude of his patriotic friends with the contempt it deserved. He lived many years after this period, dying so lately as July 16. 1767.

Mollugo
||
Moloch.

He also wrote three dramatic pieces, viz. The perplexed Couple; The Coquet; and, The Half-pay Officers; none of which met with much success.

MOLLUGO, AFRICAN CHICKWEED: A genus of the trigynia order, belonging to the triandria class of plants; and in the natural method ranking under the 22d order, *Caryophyllei*. The calyx is pentaphyllous; there is no corolla; the capsule is trilocular, and trivalved. Its characters are these: The empalement of the flower is composed of five oblong small leaves, coloured on their insides, and permanent; the flower has five oval petals shorter than the empalement; and three bristly stamina, which stand near the style, terminated by single summits; it has an oval germen, having three furrows, supporting three very short styles: the germen becomes an oval capsule with three cells, filled with small kidney-shaped seeds. There are several species, few of which are admitted into gardens. Miller reckons two and Linnæus five species. This plant is said to have an aperitive virtue.

MOLUSCA, in the Linnæan system, is the denomination of the second genus of vermes or worms. These are simple naked animals, not included in a shell, but furnished with limbs, and comprehend eighteen subordinate genera, and one hundred and ten species.

MOLO, a philosopher of Rhodes, called also Apollonius. Some are of opinion that Apollonius and Molo are two different persons, who were both natives of Alabanda, and disciples of Menecles of the same place. They both visited Rhodes, and there opened a school; but Molo came some time after Apollonius. Molo had Cicero and J. Cæsar among his pupils.

MOLOCH, a false god of the Ammonites, who dedicated their children to him, by making them "pass through the fire," as the scriptures express it. There are various opinions concerning this method of consecration. Some think, the children leaped over a fire sacred to Moloch; others, that they passed between two fires; and others, that they were really burnt in the fire, by way of sacrifice to this god. There is foundation for each of these opinions. For, first, it was usual among the pagans to lustrate or purify with fire; and, in the next place, it is expressly said, that the inhabitants of Sepharvaim burnt their children in the fire to Anamelech and Adramelech; much such deities as Moloch of the Ammonites.

Moses, in several places, forbids the Israelites to dedicate their children to this god as the Ammonites did, and threatens death and utter extirpation to such persons as were guilty of this abominable idolatry. And there is great probability that the Hebrews were much addicted to the worship of this deity; since Amos, and after him St Stephen, reproaches them with having carried along with them into the wilderness the tabernacle of their god Moloch.

Solomon built a temple to Moloch upon the mount of Olives; and Manasseh, a long time after, imitated his impiety, by making his son pass through the fire in honour of Moloch. It was chiefly in the valley of Tophet and Hinnom, to the east of Jerusalem, that the Israelites paid their idolatrous worship to this false god of the Ammonites.

There are various sentiments concerning the relation which Moloch had to the other pagan divinities. Some believe he was the same with Saturn, to whom it is

well known that human sacrifices were offered. Others suppose him to be Mercury; others, Mars; others, Mithras; and others, Venus. Lastly, others take Moloch to be the sun, or the king of heaven. Moloch was likewise called *Milkom*; as appears from what is said of Solomon, that he went after Ashtaroth the abomination of the Zidonians, and Milkom the abomination of the Ammonites.

MOLOSSES, MOLASSES, or Melasses, that gross fluid matter remaining of sugar after refining, and which no boiling will bring to a consistence more solid than that of syrup; hence also called *syrup of sugar*.

Properly, molosses are only the sediment of one kind of sugar called *chypre*, or brown sugar, which is the refuse of other sugars not to be whitened or reduced into loaves.

Molosses are much used in Holland for the preparation of tobacco, and also among poor people instead of sugar. There is a kind of brandy or spirit made of molosses; but by some held exceedingly unwholesome. See below.

Artificial MOLOSSES. There has been found a method of making molosses from apples without the addition of sugar. The apple that succeeds best in this operation is a summer sweeting of a middle size, pleasant to the taste, and so full of juice that seven bushels will yield a barrel of cyder.

The manner of making it is this: the apples are to be ground and pressed, then the juice is to be boiled in a large copper, till three quarters of it be evaporated: this will be done with a moderate fire in about six hours, with the quantity of juice above mentioned; by this time it will be of the consistence and taste as well as of the colour of molosses.

This new molosses serves to all the purposes of the common kind, and is of great use in preserving cyder. Two quarts of it, put into a barrel of racked cyder, will preserve it, and give it an agreeable colour.

The invention of this kind of molosses was owing to Mr Chandler of Woodstock in New England, who living at a distance from the sea, and where the common molasses was very dear and scarce, provided this for the supply of his own family, and soon made the practice among people of the neighbourhood. It is to be observed, that this sort of apple, the sweeting, is of great use in making cyder, one of the very best kinds we know being made of it. The people in New England also feed their hogs with the fallings of their orchards of these apples; and the consequence of this is, that their pork is the finest in the world.

MOLOSSES Spirit; a very clean and pure spirit, much used in England, and made from molosses or common treacle dissolved in water, and fermented in the same manner as malt or the common malt spirit. See DISTILLATION, n^o 10.

Molosses spirit coming dearer than that of malt, it is frequently met with basely adulterated with a mixture of that spirit, and indeed seldom is to be bought without some dash of it. Many have a way of mixing malt in the fermenting liquor; by this the yield of the whole is greatly increased, and the maker may assure the buyer that the spirit is pure as it ran from the worm.

In most of the nice cases in our compound distillery,

Moloff lery, the moloffes spirit supplies the place of a pure and clean spirit. Our cinnamon, citron, and other fine cordial waters, are made with it; for the malt spirit would impart to these a very disagreeable flavour.

Moloffes spirit gives a yellow stain to the hands or other substances dipped into it; and may therefore be of use in dyeing. It is possible also that the vinegar-makers may find use for it in their way; but the most advantageous of all its uses is to the distiller himself; a quantity of it added to new treacle intended for fermentation will be of great use in the process, and increase very considerably the quantity of spirit; but the proportion in regard to the new matter must not be too great.

MOLOSSI, a people of Epirus, who inhabited that part of the country which was called *Molossia* or *Molossus*, from king Molossus, a son of Pyrrhus and Andromache. This country had the bay of Ambracia on the south, and the country of the Perrhæbeans on the east. The dogs of the place were famous, and received the name of *Molossi* among the Romans. Dodona was the capital of the country, according to some writers. Others, however, reckon it as the chief city of Thesprotia.

MOLOSSUS, in the Greek and Latin poetry, a foot consisting of three long syllables. *As audiri, cantabant, virtutem.*

It takes its name either from a dance in use among the people called *Molossi* or *Epirote*; or from the temple of Jupiter Molossus, where odes were sung, in which this foot had a great share; or else because the march of the Molossi, when they went to the combat, was composed of these feet, or had the cadence thereof. The same foot was also called among the ancients, *Vertumnus, extensipes, bippius, & canius*.

MOLSA (Francis Maria), an eminent poet of the 16th century, was born at Modena. He gained so prodigious a reputation by his Latin and Italian poetry, that, as Paul Jovius tells us, "for 30 years together the patrons of wit at Rome strove to promote him." If he had behaved with the least prudence, he might easily have raised himself to considerable preferments and fortunes in the world; but he managed so ill that it was not possible to serve him.—He was entirely debauched, and at the same time devoid of all prudence and decency in the management of his pleasures. Hence he destroyed his reputation, and put an absolute stop to the progress of his fortunes. He died, in 1544, of the French disease. Molsa was a great orator as well as a great poet. He met once with a favourable opportunity of displaying his talent this way; for having seen the people of Rome highly incensed against Lorenzo de Medicis, who had struck off the heads of a great number of ancient statues, he accused him of that action, and (according to Paul Jovius) made so lively an oration upon it, that he perfectly overwhelmed him with confusion and despair: and it was generally believed that Lorenzo de Medicis was so confounded at the infamy with which he was branded in that oration, that, in order to efface it, he resolved to restore the city of Florence to its liberty, by assassinating Alexander de Medicis his near relation, which he did in 1537.

MOLSA (Tarquinia), daughter of Camillo Molsa,

knight of the order of St James of Spain, and grand-daughter of Francis Maria Molsa, was one of the most accomplished ladies that ever appeared in the world; wit, learning, beauty, and virtue, all uniting in her in a most extraordinary degree. Her father observing, while she was yet very young, the goodness and excellence of her genius, procured her the best masters in every branch of literature and science. Lazaro Labadini, a celebrated grammarian of those times, taught her polite literature; and her Latin compositions in prose and verse show that she attained the art of writing well, and composing correctly. She became learned in Aristotle under Camillo Corcapani; Anthony Guarini the mathematician taught her the doctrine of the sphere; she learned poetry under Francis Patricius the famous philosopher; and logic and philosophy under P. Latoni, who also instructed her thoroughly in the Greek tongue. The rabbi Abraham taught her the principles of the Hebrew language; and John Marier Barbier formed her in the politeness of the Tuscan tongue; in which she has not only written a great number of easy and elegant verses, but likewise several letters and other pieces which are in high esteem with the polite and learned in Italy. Besides her original works, she has translated several things from Greek and Latin in a manner which shows her to have understood those languages as well as her own. Afterwards she learned music, as a relaxation and diversion from her more serious studies; and in this art she attained the highest degree of perfection. She used to play upon the violin as well as upon the lute, and sing to it at the same time in so exquisite a taste as charmed every hearer; and she instituted at length a choir of ladies, over which she herself used to preside. This lady was in high reputation at the court of Alphonso II. duke of Ferrara, a prince of great judgment, and a passionate lover of every thing that was elegant; and we are told, that he stood ravished with admiration upon finding so many more accomplishments than he had been taught to expect in her. But the most authentic testimony and declaration of her high merit and character, was that which she received from the city of Rome; which, by a decree of the senate, in which all her excellences and qualifications are set forth, honoured her with the title of *Singular*, and bestowed the rights of a Roman citizen upon her and the whole family of Molsa. Molsa was married; but losing her husband without having any children, would never consent to be married again, although she was very young. She gave such lively tokens of her grief, that Patricius compares her to another Artemisia.

MOLUCILLA, in botany: A genus of the gymnospermia order, belonging to the didynamia class of plants; and in the natural method ranking under the 42d order, *Verticillatæ*. The calyx is campanulated, gradually widening larger than the corolla, and spinous.

MOLTEN-GREASE, in farriery. See there § xxii.

MOLUCCA ISLANDS, lie in the East Indian sea under the line; of which there are five principal, namely, Ternate, Tydor, Machian, Motyr, and Bachian. The largest of them is hardly 30 miles in circumference. They produce neither corn, rice, nor cattle, except

Molucilla

Molucca

Molwitz
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Molyb-
dena.

except goats: but they have oranges, lemons, and other fruits; and are most remarkable for spices, especially cloves. They have large snakes, which are not venomous, and very dangerous land crocodiles. At present they have three kings; and the Dutch, who are very strong there, keep out all other European nations, being jealous of their spice-trade. The religion is idolatry; but there are many Mahometans. They were discovered by the Portuguese in 1511, who settled upon the coast; but the Dutch drove them away, and are now masters of all these islands.

MOLWITZ, a town of Silesia, in the province of Grotzka, remarkable for a battle gained by the Prussians over the Austrians in 1741. E. Long. 16. 45. N. Lat. 50. 26.

MOLY. The name of this plant is rendered famous by Homer; and hence has been much inquired into, as to its true sense, by the botanists of almost all times. The old interpreters of Homer explain this word by the "wild rue;" and the only reason for this is, that at some time, probably long after the days of Homer, the people of Cappadocia called the wild rue *moly*. But this plant is wholly different from the moly of Homer, which Theophrastus affirms grew in his time in Arcadia in great plenty, and had a round bulbous root like an onion, and long and grassy leaves like the squill. On the whole, the moly of Homer seems to have been a species of allium or garlic.

MOLYBDENA, in chemistry, a mineral often confounded with plumbago or black lead, but possessed of different properties. It is composed of scaly laminæ of various magnitudes, scarcely adhering to each other; somewhat greasy to the touch, soiling the fingers, and leaving traces on paper of a blackish grey colour. In powder it is of a bluish colour.

"Perfect molybdena (says Mr Fourcroy) slightly detonates with nitre; the residue contains molybdena, tartar, and calx of iron. From the experiments of Mr Scheele, molybdena appears to consist of a peculiar combustible matter and iron. The nature of the combustible matter is not yet perfectly known. Mr Hielm, a disciple of the celebrated Bergman, appears to have succeeded in converting it into a regulus. Mr Pelletier affirms, that he has had the same success; but the properties of this new metal have not yet been examined. The molybdenic acid appears to be a metallic one. Its weight, its styptic and austere taste, its dry and pulverulent form, its fusibility, insolubility, the colour it assumes by action of flame and combustible matters, its precipitation by nut-galls and the acid of Prussian blue, show that it is somewhat similar to the arsenical acid. This substance is so rare in France, that no chemist except M. Pelletier has had an opportunity of making a regular series of experiments upon it. It is greatly to be wished that they should be continued, especially with a view of deciding whether the molybdenic acid be truly different from all others; for I cannot avoid thinking, notwithstanding its peculiar characters, that a substance which does not become acid but by the assistance of 30 parts of weak nitrous acid, and is with so much difficulty brought to assume the saline state, ought not to be considered as an acid truly peculiar."

See CHEMISTRY-Index; and MINERALOGY, p. 134.

Molybdena is found sometimes along with tin-ores and iron-ores, that are attracted by the magnet, among copperish pyrites; and also with wolfram, in Saxony, Iceland, Sweden, France, Spain, &c.

MOLYBDIA, in natural history, the name of a genus of crystals of a cubic form, or composed of six sides, at right angles, like a dye.

MOLYN (Peter), called *Tempesta* and *Pietro Mulier*, an eminent painter, was born at Haerlem in 1637. According to some authors, he was the disciple of Snyders, whose manner of painting he at first imitated. But his genius led him to the study of dismal subjects; and he so far excelled in painting tempests, storms at sea, and shipwrecks, that he was called by way of distinction *Tempesta*. His pictures are very rare, and held in the greatest estimation. The name of *Pietro Mulier*, or *de Mulieribus*, was given him on account of having caused his wife to be assassinated, in order to marry a young lady of Genoa with whom he was in love. But this villainous transaction being discovered, he was seized, imprisoned, and capitally condemned. However, the greatness of his merit as an artist occasioned a mitigation of the sentence; but he was still detained in prison, where he diligently followed his profession, and would have continued there in all probability for life, had he not met with an opportunity of escaping to Placentia, at the time Louis XIV. bombarded the city of Genoa, after he had been in confinement 16 years. To this artist are attributed several very neat prints, executed with the graver only, in a style greatly resembling that of John Vander Velde. They consist chiefly of candle-light pieces and dark subjects. M. Heinekin mentions *Peter Moly* the elder, who was a native of Holland, and a painter; but not so eminent as *Tempesta*. Some suppose the prints above mentioned ought to be ascribed to the latter; as, though very neatly executed, they are laboured heavy performances, and not equal in any degree to what one might expect from the hand of an artist of so much repute as *Tempesta*.

MOLYNEUX (William), an excellent mathematician and astronomer, was born at Dublin in 1656, and admitted into the university of that city; which when he left, he carried with him a testimonial drawn up in an uncommon form, and in the strongest terms, signifying the high opinion conceived of his genius, the probity of his manners, and the remarkable progress he had made in letters. In 1675, he entered in the middle-temple, where he spent three years in the study of the laws of his country; but the bent of his genius lay strongly toward mathematics and philosophical studies; and even at the university he conceived a dislike to scholastic learning, and fell into the methods of Lord Bacon. Returning to Ireland in June 1678, he shortly after married Lucy the daughter of Sir William Domville the king's attorney-general. Being master of an easy fortune, he continued to indulge himself in prosecuting such branches of natural and experimental philosophy as were most agreeable to his fancy; wherein astronomy having the greatest share, he began, about 1681, a literary correspondence with Flamsteed the king's astronomer, which he kept up for several years. In 1683, he formed a design of erecting a philosophical society at Dublin, in imita-

Molybdia
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Molyneux.

Molyneux. tion of the Royal Society at London; and, by the countenance and encouragement of Sir William Petty, who accepted the office of president, they began a weekly meeting that year, when our author was appointed their first secretary.

Mr Molyneux's reputation for learning recommended him, in 1684, to the notice and favour of the first and great duke of Ormond, then lord-lieutenant of Ireland; and chiefly by his grace's influence he was appointed, that year, with Sir William Robinson, surveyor general of his majesty's buildings and works, and chief engineer. In 1686, he was sent abroad by the government to view the most considerable fortresses in Flanders. He travelled, in company with Lord Mountjoy, through that country, Holland, part of Germany, and France. Upon his return from Paris to London, in April 1680, he published his *Sciothericum Telescopium*, containing a description of the structure and use of a telescopic dial invented by him. The severities of Tyrconnel's government forced him, with many others, into England, where he spent two years with his family, his place of residence being at Chester. In this retirement he wrote his *Dioptrics*, dedicated to the Royal Society. Here he lost his lady, who died soon after she had brought him a son. Illness had deprived her of her eye-sight 12 years before, that is, soon after she was married; from which time she had been very sickly, and afflicted with extreme pains of the head. As soon as the public tranquillity was settled in his native country, he returned home; and, upon the convening of a new parliament in 1692, was chosen one of the representatives for the city of Dublin. In the next parliament, in 1695, he was chosen to represent the university there, and continued to do so to the end of his life; that learned body having, before the end of the first session of the former, conferred on him the degree of doctor of laws. He was likewise nominated by the lord-lieutenant one of the commissioners for the forfeited estates, to which employment was annexed a salary of 500*l.* a-year; but looking upon it as an invidious office, he declined it. In 1698, he published "The Case of Ireland stated, in relation to its being bound by Acts of Parliament made in England:" in which he is supposed to have delivered all, or most, that can be said upon this subject, with great clearness and strength of reasoning. Among many persons with whom he maintained correspondence and friendship, Mr Locke was in a particular manner dear to him, as appears from their letters. In the above year, which was the last of his life, he made a journey to England, on purpose to pay a visit to that great man; and not long after his return to Ireland was seized with a fit of the stone, of which died. Besides the works already mentioned, he published several pieces in the *Philosophical Transactions*.

MOLYNEUX (Samuel), son of the former, was born at Chester in July 1689; and educated with great care by his father, according to the plan laid down by Locke upon that subject. When his father died, he fell under the management of his uncle, Dr Thomas Molyneux, an excellent scholar and physician at Dublin, and also an intimate friend of Mr Locke; who executed his trust so well, that Mr Molyneux became afterwards a most polite and accomplished

gentleman, and was made secretary to his late majesty when he was prince of Wales. Astronomy being his favourite study, as it had been his father's, he projected many schemes for the advancement of it, and was particularly employed in the years 1723, 1724, and 1725, in perfecting the method of making telescopes; one of which, of his own making, he had presented to John V. king of Portugal. In the midst of these thoughts, being appointed a commissioner of the admiralty, he became so engaged in public affairs, that he had not leisure to pursue these enquiries any farther; and gave his papers to Dr Robert Smith, professor of astronomy at Cambridge, whom he invited to make use of his house and apparatus of instruments, in order to finish what he had left imperfect. Mr Molyneux dying soon after, Dr Smith lost the opportunity; yet, supplying what was wanting from Mr Huygens and others, he published the whole in his "Complete Treatise of Optics."

MOMBAZA, or **MONBAZA**, a town of Africa, in an island of the same name, with a castle and a fort: seated on the eastern coast, opposite to the country of Mombaza in Zanguebar, 70 miles south of Melinda, and subject to Portugal. E. Long 48. o. N. Lat. 44. o.

MOMBAZA, a country of Africa in Zanguebar, subject to the Portuguese, from whence they export slaves, gold, ivory, rice, flesh, and other provisions, with which they supply the settlements in Brasil. The king of this country being a Christian, had a quarrel with the Portuguese governor, took the castle by assault, turned Mahometan, and murdered all the Christians, in 1631; but in 1729 they became masters of the territory again.

MOMENT, in the doctrine of time, an instant, or the most minute and indivisible part of duration.

MOMENTUM, in mechanics, signifies the same with impetus, or the quantity of motion in a moving body; which is always equal to the quantity of matter multiplied into the velocity; or, which is the same thing, it may be considered as a rectangle under the quantity of matter and velocity. See **MECHANICS**.

MOMORDICA, **MALE BALSAM APPLE**: A genus of the syngenesia order, belonging to the monoecia class of plants; and in the natural method ranking under the 34th order, *Cucurbitaceæ*. The male calyx is quinquefid; the corolla sexpartite; the filaments are three in number. The female calyx is trifid; the corolla quinquepartite; the style trifid; the fruit is an apple parting asunder with a spring. The most remarkable species are, 1. The balsamina, or male balsam apple. This is a native of Asia; and has a trailing stalk like those of the cucumber or melon, with smooth leaves, cut into several segments, and spread open like a hand. The fruit is oval, ending in acute points, having several deep angles, with sharp tubercles placed on their edges. It changes to a red or purplish colour when ripe, opening with an elasticity, and throwing out its seeds. 2. The elaterium, wild or spurting cucumber, has a large fleshy root, somewhat like briony, from whence come forth every spring several thick, rough, trailing stalks, dividing into many branches, and extending every way two or three feet; these are garnished with thick, rough, almost heart-shaped leaves, of a grey colour,

Mombaza.
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Mombazica.

Momus,
Mona

colour, standing upon long foot-stalks. The flowers come out from the wings of the stalks: these are male and female, growing at different places on the same plant like those of the common cucumber: but they are much less, of a pale yellow colour, with a greenish bottom; the male flowers stand upon thick, short, foot-stalks, but the female flowers sit upon the young fruit; which, after the flower is faded, grows of an oval form, an inch and a half long, swelling like a cucumber, of a grey colour like the leaves, and covered over with short prickles. This species has one of its names from the property of casting out its seeds, together with the viscid juice in which the seeds are lodged, with a violent force, if touched while ripe.

Uses. The first species is famous in Syria for curing wounds. The natives cut open the unripe fruit, and infuse it in sweet oil, which they expose to the sun for some days, until it becomes red; and then present it for use. Dropped on cotton, and applied to a fresh wound, the Syrians reckon this oil the best vulnerary next to balsam of Mecca, having found by experience that it often cures large wounds in three days. The leaves and stems of this plant are used for arbores or bowers. The elaterium of the shops is the fruit, or rather the inspissated fæcula, of the juice of the unripe fruit of the wild cucumber. It is usually sent us from Spain and the southern parts of France, where the plant is common. We receive it in small, flat, whitish lumps, or cakes, that are dry, and break easily between the fingers. It is of an acrid, nauseous, bitter taste, and has a strong offensive smell when newly made; but these, as well as its other properties, it loses after being kept for some time. It is a very violent purge and vomit, and is now but seldom used. From the property which the plant has of throwing out its seeds, it has sometimes been called *Noli me tangere*.

MOMUS, in fabulous history, the god of raillery, or the jester of the celestial assembly, and who ridiculed both gods and men. Being chosen by Vulcan, Neptune, and Minerva, to give his judgment concerning their works, he blamed them all: Neptune for not making his bull with horns before his eyes, in order that he might give a surer blow; Minerva for building an house that could not be removed in case of bad neighbours; and Vulcan, for making a man without a window in his breast, that his treacheries might be seen. For his free reflections upon the gods, Momus was driven from heaven. He is generally represented raising a mask from his face, and holding a small figure in his hand.

MONA, two islands of this name in the sea lying between Britain and Ireland. The one described by Cæsar, as situated in the mid-passage between both islands, and stretching out in length from south to north. Called *Monaeda* (Ptolemy); *Monapia*, or *Monalia* (Pliny). Supposed to be the Isle of Man.—Another Mona, (Tacitus); an island more to the south, and of greater breadth; situated on the coast of the Ordovices, from which it is separated by a narrow strait. The ancient seat of the Druids. Now called *Anglesey*, the island of the Angles or English.

MONA, an island of the Baltic Sea, south-west of the island of Zealand, subject to Denmark. E. Long. 12. 30. N. Lat. 55. 20.

Nº 226.

MONA. See INCHCOLM.

MONACO, a small but handsome and strong town of Italy, in the territory of Genoa, with a castle, citadel, and a good harbour. It is seated on a craggy rock, and has its own prince, under the protection of France. E. Long. 7. 33. N. Lat. 43. 48.

MONAD, see *LEIBNITZIAN Philosophy*.

MONADELPHIA, (from *μονος* alone, and *αδελφια* a brotherhood;) a “single brotherhood:” The name of the 16th class in Linnæus’s sexual system, consisting of plants with hermaphrodite flowers; in which all the stamina, or male organs of generation, are united below into one body or cylinder, through which passes the pointal or female organ. See BOTANY, p. 437.

MONAGHAN, a county of Ireland, situated in the province of Ulster, is bounded by Tyrone on the north, Armagh on the east, Cavan and Louth on the south, and Fermanagh on the west. It is a boggy and mountainous tract, but in some places is well improved. It contains 170,090 Irish plantation acres, 24 parishes, five baronies, and one borough, and sends four members to parliament. It is about 30 miles long and 22 broad. The linen trade of this county is averaged at L. 104,000 yearly.

MONAGHAN, a post, fair, and market town, and chief of the county of that name, is distant 62 miles from Dublin; it is a borough, and returns two members to parliament; patron Lord Clermont. It gives title of baron to the family of Blayney, and has six fairs. It was anciently called *Muinechan*. An abbey was founded here in a very early age, of which Moelodius the son of Aodh was abbot. In 1462, a monastery for conventual Franciscans was erected on the site of this abbey, which was granted on the general suppression of monasteries to Edward Withe, and a castle has been since erected on the site by Edward Lord Blayney.

MONAMY (P.), a good painter of sea-pieces, was born in Jersey; and certainly (says Mr Walpole), from his circumstances or the views of his family he had little reason to expect the fame he afterwards acquired, having received his first rudiments of drawing from a sign and house painter on London-bridge. But when nature gives real talents they break forth in the homeliest school. The shallow waves that rolled under his window taught young Monamy what his master could not teach him, and fitted him to imitate the turbulence of the ocean. In painter’s hall is a large piece by him, painted in 1726. He died at his house in Westminster the beginning of 1749.

MONANDRIA, (from *μονος* alone, and *ανδρ* a man or husband:) The name of the first class in Linnæus’s sexual system; consisting of plants with hermaphrodite flowers, which have only one stamen or male organ.

MONARCHY, a large state governed by one; or a state where the supreme power is lodged in the hands of a single person. The word comes from the Greek *μοναρχης*, “one who governs alone;” formed of *μονος*, *solus*, and *αρχη* *imperium*, “government.” Of the three forms of government, viz. democracy, aristocracy, and monarchy, the last is the most powerful, all the sinews of government being knit together, and united in the hand of the prince; but then there is imminent

Monaco
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Monarchy.

Monarchy. imminent danger of his employing that strength to improvident or oppressive purposes. As a democracy is the best calculated to direct the end of a law, and an aristocracy to invent the means by which that end shall be obtained, a monarchy is most fit for carrying those means into execution.

The most ancient monarchy was that of the Assyrians, which was founded soon after the deluge. We usually reckon four grand or universal monarchies; the Assyrian, Persian, Grecian, and Roman; though St Augustine makes them but two, viz. those of Babylon and Rome. Belus is placed at the head of the series of Assyrian kings who reigned at Babylon, and is by profane authors esteemed the founder of it, and by some the same whom the scriptures call Nimrod. The principal Assyrian kings after Belus were Ninus, who built Nineveh, and removed the seat of empire to it; Semiramis, who, disguising her sex, took possession of the kingdom instead of her son, and was killed and succeeded by her son Ninyas; and Sardanapalus, the last of the Assyrian monarchs, and more effeminate than a woman. After his death the Assyrian empire was split into three separate kingdoms, viz. the Median, Assyrian, and Babylonian. The first king of the Median kingdom was Arbaces; and this kingdom lasted till the time of Astyages, who was subdued and divested of his kingdom by Cyrus.

In the time of Cyrus there arose a new and second monarchy called the Persian, which stood upwards of 200 years from Cyrus, whose reign began A. M. 3468, to Darius Codomannus, who was conquered by Alexander, and the empire translated to the Greeks A. M. 3674.—The first monarch was Cyrus, founder of the empire. 2. Cambyfes, the son of Cyrus. 3. Smerdis. 4. Darius, the son of Hystaspis, who reigned 521 years before Christ. 5. Xerxes, who reigned 485 years before Christ. 6. Artaxerxes Longimanus, who reigned 464 years before Christ. 7. Xerxes the second. 8. Ochus, or Darius, called Nothus, 424 years before Christ. 9. Artaxerxes Mnemon, 405 years before Christ. 10. Artaxerxes Ochus, 359 years before Christ. 11. Arses, 338 years before Christ. 12. Darius Codomannus, 336 years before Christ, who was defeated by Alexander the Great, and deprived of his kingdom and life about 331 years before Christ: the dominion of Persia after his death was translated to the Greek.

The third monarchy was the Grecian. As Alexander, when he died, did not declare who should succeed him, there started up as many kings as there were commanders. At first they governed the provinces that were divided among them under the title of viceroys; but when the family of Alexander the Great was extinct, they took upon them the name of kings. Hence, in process of time, the whole empire of Alexander produced four distinct kingdoms, viz. 1. The Macedonian; the kings of which, after Alexander, were Antipater, Cassander, Demetrius Poliorcetes, Seleucus Nicanor, Meleager, Antigonus Dofon, Philip, and Perseus, under whom the Macedonian kingdom was reduced to the form of a Roman province. 2. The Asiatic kingdom, which upon the death of Alexander fell to Antigonus, comprehending that country now called Natolia, together with some other regions beyond Mount Taurus. From this kingdom proceeded two lesser ones, viz. that of

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Pergamus, whose last king, Attalus, appointed the Roman people to be his heir; and Pontus, reduced by the Romans into the form of a province, when they had subdued the last king, Mithridates. 3. The Syrian, of whose twenty-two kings the most celebrated were, Seleucus Nicanor, founder of the kingdom; Antiochus Deus; Antiochus the Great; Antiochus Epiphanes; and Tigranes, who was conquered by the Romans under Pompey; and Syria reduced into the form of a Roman province. 4. The Egyptian, which was formed by the Greeks in Egypt, and flourished near 240 years under 12 kings, the principal of whom were, Ptolemy Lagus, its founder; Ptolemy Philadelphus, founder of the Alexandrian library; and queen Cleopatra, who was overcome by Augustus, in consequence of which Egypt was added to the dominion of the Romans.

The fourth monarchy was the Roman, which lasted 244 years, from the building of the city until the time when the royal power was abrogated. The kings of Rome were, Romulus, its founder; Numa Pompilius; Tullus Hostilius; Ancus Martius; Tarquinius Priscus; Servius Tullius; and Tarquin the Proud, who was banished, and with whom terminated the regal power.

There seems in reality no necessity to make the Medes, Persians, and Greeks, succeed to the whole power of the Assyrians, to multiply the number of the monarchies. It was the same empire still; and the several changes that happened in it did not constitute different monarchies. Thus the Roman empire was successively governed by princes of different nations, yet without any new monarchy being formed thereby. Rome, therefore, may be said to have immediately succeeded Babylon in the empire of the world. See EMPIRE.

Of monarchies some are absolute and despotic, where the will of the monarch is uncontrollable; others are limited, where the prince's authority is restrained by laws, and part of the supreme power lodged in other hands, as in Britain. See GOVERNMENT.

Some monarchies again are hereditary, where the succession devolves immediately from father to son; and others are elective, where, on the death of the monarch, his successor is appointed by election, as in Poland.

Fifth-MONARCHY Men, in the ecclesiastical history of England, were a set of wrong-headed and turbulent enthusiasts who arose in the time of Cromwell, and who expected Christ's sudden appearance upon earth to establish a new kingdom; and, acting in consequence of this illusion, aimed at the subversion of all human government.

MONARDA, INDIAN HOREHOUND, in botany: A genus of the monogynia order, belonging to the dianthia class of plants; and in the natural method ranking under the 42d order, *Verticillatæ*. The corolla is unequal, with the upper lip linear, involving the filaments; there are four seeds. The most remarkable species is the zeylanica, a native of the East Indies. It rises with an herbaceous, four-cornered, hoary stalk, and bears leaves that are entire, nearly heart-shaped, woolly, deep notched on the edges, and having foot-stalks. The flowers, which are purplish and fragrant, surround the stalk in whorls, each whorl containing about 14 flowers; and are succeeded by four small

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kidney-

Monarchy,
Monarda.

Monardes kidney-shaped shining seeds, lodged in the bottom of the permanent flower-cup. The Indians superstitiously believe that a fumigation of this plant is effectual for driving away the devil; and from this imaginary property its name in the Ceylonese language is derived. Grimmer relates, in his *Laboratorium Ceylonicum*, that for taste and smell this species of horehound stands remarkably distinguished. A water and subtile oil are obtained from it, both of which are greatly commended in obstructions of the matrix. A syrup is likewise prepared from this plant, which is useful in the above-mentioned disorders as well as in diseases of the stomach.

MONARDES (Nicholas), an excellent Spanish physician of Seville, who lived in the 16th century: and deservedly acquired great reputation by his practical skill and the books which he wrote. His Spanish works have been translated into Latin by Clusius, into Italian by Annibal Brigantus, and those upon American drugs have appeared in English. He died about the year 1578.

MONASTEREVAN, a post town of Ireland, in the county of Kildare and province of Leinster, 36 miles from Dublin. This town takes its name from a magnificent abbey which was founded here, in which St Evan in the beginning of the 7th century placed a number of monks from south Munster, and which had the privilege of being a sanctuary. St Evan's festival is held on the 22d of December. The consecrated bell, which belonged to this saint, was on solemn trials sworn upon by the whole tribe of the Eoganachts, and was always committed to the care of the Mac Evans, hereditary chief justices of Munster; the abbot of this house sat as a baron in parliament.—At the general suppression of monasteries, this abbey was granted to George Lord Audley, who assigned it to Adam Loftus, viscount Ely. It afterwards came into the family of Moor, earls of Drogheda, and has been beautifully repaired by the present Lord Drogheda, still wearing the venerable appearance of an abbey. There is a nursery at Monasterewan for the charter schools of the province of Leinster; and the grand canal has been carried up to this town from Dublin, since which it has been much improved and enlarged with several new buildings. It is a market-town, and also holds four fairs in the year.

MONASTERY, a convent or house built for the reception of religious; whether it be abbey, priory, nunnery, or the like.

MONASTERY is only properly applied to the houses of monks, mendicant friars, and nuns. The rest are more properly called *religious houses*. For the origin of monasteries, see MONASTIC and MONK.

The houses belonging to the several religious orders which obtained in England and Wales were, cathedrals, colleges, abbeys, priories, preceptories, commandries, hospitals, friaries, hermitages, chantries, and free chapels. These were under the direction and management of various officers. The dissolution of houses of this kind began so early as the 1312, when the Templars were suppressed; and in 1323 their lands, churches, advowsons, and liberties, here in England, were given by 17 Ed. II. st. 3. to the prior and brethren of the hospital of St John at Jerusalem. In the years

1390, 1437, 1441, 1459, 1497, 1505, 1508, and 1515, several other houses were dissolved, and their revenues settled on different colleges in Oxford and Cambridge. Soon after the last period, Cardinal Wolsey, by licence of the king and pope, obtained a dissolution of above 30 religious houses for the founding and endowing his colleges at Oxford and Ipswich. About the same time a bull was granted by the same pope to Cardinal Wolsey to suppress monasteries, where there were not above six monks, to the value of 8000 ducats a-year, for endowing Windsor and King's College in Cambridge; and two other bulls were granted to Cardinals Wolsey and Campeius, where there were less than twelve monks, and to annex them to the greater monasteries; and another bull to the same cardinals to inquire about abbeys to be suppressed in order to be made cathedrals. Although nothing appears to have been done in consequence of these bulls, the motive which induced Wolsey and many others to suppress these houses was the desire of promoting learning; and Archbishop Cranmer engaged in it with a view of carrying on the Reformation. There were other causes that concurred to bring on their ruin: many of the religious were loose and vicious; the monks were generally thought to be in their hearts attached to the pope's supremacy; their revenues were not employed according to the intent of the donors; many cheats in images, feigned miracles, and counterfeit relics, had been discovered, which brought the monks into disgrace; the Observant friars had opposed the king's divorce from Queen Catherine; and these circumstances operated, in concurrence with the king's want of a supply and the people's desire to save their money, to forward a motion in parliament, that in order to support the king's state and supply his wants, all the religious houses might be conferred upon the crown which were not able to spend above L. 200 a-year; and an act was passed for that purpose 27 Hen. VIII. c. 28. By this act about 380 houses were dissolved, and a revenue of L. 30,000 or L. 32,000 a-year came to the crown; besides about L. 100,000 in plate and jewels. The suppression of these houses occasioned discontent, and at length an open rebellion: when this was appeased, the king resolved to suppress the rest of the monasteries, and appointed a new visitation; which caused the greater abbeys to be surrendered apace; and it was enacted by 31 Hen. VIII. c. 13. that all monasteries, &c. which have been surrendered since the 4th of February, in the 27th year of his majesty's reign, and which hereafter shall be surrendered, shall be vested in the king. The knights of St John of Jerusalem were also suppressed by the 32 Hen. VIII. c. 24. The suppression of these greater houses by these two acts produced a revenue to the king of above L. 100,000 a-year, besides a large sum in plate and jewels. The last act of dissolution in this king's reign was the act of 37 Hen. VIII. c. 4. for dissolving colleges, free chapels, chantries, &c. which act was farther enforced by 1 Edw. VI. c. 14. By this act were suppressed 90 colleges, 110 hospitals, and 2374 chantries and free chapels. The number of houses and places suppressed from first to last, so far as any calculations appear to have been made, seems to be as follow:

Monastery. Of lesser monasteries, of which we have the va-	
uation,	374
Of greater monasteries,	186
Belonging to the hospitallers,	48
Colleges,	90
Hospitals,	110
Chuntries and free chapels,	2374

Total 3182

Besides the friars houses and those suppressed by Wolsey, and many small houses of which we have no particular account.

The sum total of the clear yearly revenue of the several houses at the time of their dissolution, of which we have any account, seems to be as follows:

Of the greater monasteries,	L. 104,919	13	3 $\frac{1}{2}$
Of all those of the lesser monasteries			
of which we have the valuation,	29,702	1	10 $\frac{1}{2}$
Knights hospitallers head house in			
London,	2385	12	8
We have the valuation of only 28 of			
their houses in the country,	3026	9	5
Friars houses of which we have the			
valuation,	751	2	0 $\frac{1}{4}$

Total L. 140,784 19 3 $\frac{1}{4}$

If proper allowances are made for the lesser monasteries and houses not included in this estimate, and for the plate, &c. which came into the hands of the king by the dissolution, and for the value of money at that time, which was at least six times as much as at present, and also consider that the estimate of the lands was generally supposed to be much under the real worth, we must conclude their whole revenues to have been immense

It does not appear that any computation hath been made of the number of persons contained in the religious houses

Those of the lesser monasteries dissolved by 27 Hen. VIII. were reckoned at about 10,000

If we suppose the colleges and hospitals to have contained a proportionable number, these will make about 5347

If we reckon the number in the greater monasteries, according to the proportion of their revenues, they will be about 35,000; but as probably they had larger allowances in proportion to their number than those of the lesser monasteries, if we abate upon that account 5000, they will then be 30,000

One for each chantry and free chapel, 2374

Total 47,721

But as there were probably more than one person to officiate in several of the free chapels, and there were other houses which are not included within this calculation, perhaps they may be computed in one general estimate at about 50,000. As there were pensions paid to almost all those of the greater monasteries, the king did not immediately come into the full enjoyment of their whole revenues: however, by means of what he did receive, he founded six new bishoprics, viz. those of Westminster (which was changed by Queen Elisabeth into a deanery, with twelve prebends

and a school), Peterborough, Chester, Gloucester, Bristol, and Oxford. And in eight other sees he founded deaneries and chapters, by converting the priors and monks into deans and prebendaries, viz. Canterbury, Winchester, Durham, Worcester, Rochester, Norwich, Ely, and Carlisle. He founded also the colleges of Christ-church in Oxford and Trinity in Cambridge, and finished King's college there. He likewise founded professorships of divinity, law, physic, and of the Hebrew and Greek tongues, in both the said universities. He gave the house of Grey-friars and St Bartholomew's hospital to the city of London, and a perpetual pension to the poor knights of Windsor, and laid out great sums in building and fortifying many ports in the channel. It is observable, upon the whole, that the dissolution of these houses was an act, not of the church, but of the state; in the period preceding the Reformation, by a king and parliament of the Roman catholic communion in all points except the king's supremacy; to which the pope himself, by his bulls and licences, had led the way.

MONASTIC, something belonging to monks, or the monkish life. The monastic profession is a kind of civil death, which in all worldly matters has the same effect with the natural death. The council of Trent, &c. fix sixteen years for the age at which a person may be admitted into the monastical state.

St Antony is the person who, in the fourth century, first instituted the monastic life; as St Pachomius, in the same century, is said to have first set on foot the cœnobitic life, i. e. regular communities of religious. In a short time the deserts of Egypt became inhabited with a set of solitaries, who took upon them the monastic profession. St Basil carried the monkish humour into the east, where he composed a rule which afterwards obtained through a great part of the west.

In the 11th century the monastic discipline was grown very remiss. St Odo first began to retrieve it in the monastery of Cluny: that monastery, by the conditions of its erection, was put under the immediate protection of the holy see; with a prohibition to all powers, both secular and ecclesiastical, to disturb the monks in the possession of their effects or the election of their abbot. In virtue hereof they pleaded an exemption from the jurisdiction of the bishop, and extended this privilege to all the houses dependent on Cluny. This made the first congregation of several houses under one chief immediately subject to the pope, so as to constitute one body, or, as they now call it, one religious order. Till then, each monastery was independent and subject to the bishop. See MONK.

MONCAON, or MONZON, a town of Portugal, in the province of Entre-Douro-de-Minho, with a strong castle. The Spaniards have several times attempted to take it, but in vain. W. Long. 8. 2. N. Lat. 41. 52.

MONCON, or MONZON, a strong town of Spain, in the kingdom of Arragon. It was taken by the French in 1642, but the Spaniards retook it the following year. It is seated at the confluence of the rivers Sosa and Cinca. E. Long. 0. 19. N. Lat. 41. 43.

MONCRIF (François Augustin Paradis de), se-

D d 2

cretary

Monastre

Moncrie

Moncrif,
Monda.

cretary to M. le comte de Clermont, reader to the queen, one of the 40 of the French academy, and a member of the academies of Nanci and Berlin, was born at Paris of respectable parents A.D. 1687, and died there Nov. 12. 1770, aged 83.

*Avec des mœurs dignes de l'âge d'or,
Il fut un ami sur, un auteur agréable ;
Il mourut vieux comme Nestor,
Mais il fut moins bavard et beaucoup plus aimable.*

Such was Moncrif. He possessed an elegant mind, an engaging person, an unceasing desire to please, and a gentle, equable, and obliging temper. The advantage of reading in a very superior and interesting manner, of singing tender airs, and of composing agreeable couplets, soon procured him a great number of friends, and many of these of the first rank. He asked permission to accompany a celebrated minister who was banished in 1757; but though such disinterested attachment was highly admired, he was only allowed to go every year to express his gratitude to him in his retreat. He was never ashamed of the poverty of his relations, but assisted them and brought them forward by his influence at court. He had been at first a fencing-master; and it is said that he foresaw he would be obliged to employ his sword in defence of his works. Most of them needed not this precaution. The principal are, 1. *Essai sur la nécessité et sur les moyens de plaire*, in 12mo. This production is written in a lively ingenious manner, is full of excellent maxims, and has gone through many editions. In the present age, a greater share of argument would be expected; but the chief merit of the work is, that, unlike the productions of many moralists, it contains nothing which the author himself did not reduce to practice. He had made it his study to contribute to the delight and amusement of those respectable societies into which he was admitted. 2. *Les Ames rivales*, an agreeable little romance, in which there occur several ingenious observations on French manners; the *Abderites*, a comedy of but ordinary merit; *Poésies diverses*, full of delicacy (his *Romances* and his *Rajeunissement inutile* are particularly distinguished for smooth versification, elegant reflections, and pleasing narration); and some dissertations which display considerable wit and information. These pieces are to be found in the miscellaneous works of the author, published at Paris 1743, in 12mo. 3. Some little pieces of one act; which make part of different operas, called the *Fragmens*, *Zelindor*, *Ismene Almasis*, the *Genies tutélaires*, and the *Sibylle*. He was devoted to lyric poetry, and cultivated it with success. In this species of writing we have from his pen the *Empire de l'Amour*, a ballet; the *Trophée*; the *Ames réunies*, a ballet which was never acted; and *Erosine*, a heroic pastoral. 4. *L'Histoire des Chats*, a trifling performance, too severely censured at the time, and now almost wholly fallen into oblivion. This work gave the Comte d'Argenson an opportunity of being witty at the author's expence. When Voltaire retired into Prussia, Moncrif applied to the minister for the vacant place of historiographer: "*Historiographe!* (said the Comte d'Argenson), vous voulez sans doute dire historiogriphe." His works were collected, in 1761, into 4 vols, 12mo.

MONDA, or MÜNDA (anc. geog.), a river of Lu-

sitania, running midway from east to west into the Atlantic, between the Durius and Tagus, and washing Conimbrica. Now the *Mondego*, a river of Portugal, which running by Coimbra, falls into the Atlantic, 30 miles below it.

MONDAY, the second day of the week, so called as being anciently sacred to the moon; *q. d.* moon-day.

MONDOVI, a considerable town of Italy, in Piedmont; with a citadel, university, and bishop's see. It is the largest and most populous town of Piedmont, and is seated in E. Long. 8. 15. N. Lat. 44. 23.

MONEMUGI, an empire in the south of Africa, has Zanguebar on the east, Monomotapa on the south; Motamba and Makoko on the west, and Abyssinia on the north and partly to the east, though its boundaries that way cannot be ascertained. It is divided into the kingdoms of Mujaco, Makoko or Anfiko, Gingiro, Cambate, Alaba, and Monemugi Proper. This last lies in the middle of the torrid zone, and about the equinoctial line south of Makoko, west of Zanguebar, north of Monomotapa, and east of Congo and of the northern parts of Monomotapa. To ascertain its extent, is too difficult a task, being a country so little frequented. The country known, abounds with gold, silver, copper mines, and elephants. The natives clothe themselves in silks and cottons, which they buy of strangers, and wear collars of transparent amber-beads, brought them from Cambaya: which beads serve also instead of money; gold and silver being too common, and of little value among them.

Their monarch always endeavours to be at peace with the princes round about him, and to keep an open trade with Quito, Melinda, and Mombaza, on the east, and with Congo on the west; from all which places the black merchants resort thither for gold. The Portuguese merchants report, that on the east side of Monemugi there is a great lake full of small islands, abounding with all sorts of fowl and cattle, and inhabited by negroes. They relate also, that on the main-land eastward they heard sometimes the ringing of bells, and that one could observe buildings very much like churches; and that from these parts came men of a brown and tawny complexion, who traded with those islanders, and with the people of Monemugi.

This country of Monemugi affords also abundance of palm-wine and oil, and such great plenty of honey, that above half of it is lost, the blacks not being able to consume it. The air is generally very unwholesome, and excessively hot, which is the reason why no Christians undertake to travel in this empire. De Lisse gives the division of this country as follows: The Maracates, the Messiguaries, the kingdom of the Buengas, the kingdom of Masti, and that of Maravi. But we are not acquainted with any particulars relating to these nations or kingdoms.

MONETARIUS, or MONEYER, a name which antiquaries and medalists give to those who struck the ancient coins or monies.

Many of the old Roman, &c. coins have the name of the *monetarius*, either written at length or at least the initial letters of it. See MEDAL.

MONEY,

Monday
||
Moneta-
rius.

Money.

MONEY, a piece of matter, commonly metal, to which public authority has affixed a certain value and weight to serve as a medium in commerce. See COIN, COMMERCE, and MEDALS; also the article BANK.

Money is usually divided into *real* or *effective*, and *imaginary* or *money of account*.

I. REAL Money.

1. *History of real Money.* Real money includes all coins, or species of gold, silver, copper, and the like; which have course in common, and do really exist. Such are guineas, pistoles, pieces of eight, ducats, &c.

Real money, civilians observe, has three essential qualities, *viz.* matter, form, and weight or value.

For the matter, copper is that thought to have been first coined; afterwards silver; and lastly gold, as being the most beautiful, scarce, cleanly, divisible, and pure of all metals.

The degrees of goodness are expressed in gold by carats; and in silver by pennyweights, &c. For there are several reasons for not coining them pure and without alloy, *viz.* the great loss and expence in refining them, the necessity of hardening them to make them more durable, and the scarcity of gold and silver in most countries. See ALLOY.

Among the ancient Britons, iron rings, or, as some say, iron plates, were used for money; among the Lacedemonians, iron bars quenched with vinegar, that they might not serve for any other use. Seneca observes, that there was anciently stamped money of leather, *corium forma publica impressum*. And the same thing was put in practice by Frederic II. at the siege of Milan; to say nothing of an old tradition among ourselves, that in the confused times of the barons wars the like was done in England: but the Hollanders, we know, coined great quantities of pasteboard in the year 1574.

As to the form of money, it has been more various than the matter. Under this are comprehended the weight, figure, impression, and value.

For the impression, the Jews, though they detested images, yet stamped on the one side of their shekel the golden pot which had the manna, and on the other Aaron's rod. The Dardans stamped two cocks fighting. The Athenians stamped their coins with an owl, or an ox; whence the proverb on bribed lawyers, *Bos in lingua*. They of Ægina, with a tortoise; whence that other saying, *Virtutem et sapientiam vincunt testudines*. Among the Romans, the monetarii sometimes impressed the images of men that had been eminent in their families on the coins: but no living man's head was ever stamped on a Roman coin till after the fall of the commonwealth. From that time they bore the emperor's head on one side. From this time the practice of stamping the prince's image on coins has obtained among all civilized nations; the Turks and other Mahometans alone excepted, who, in detestation of images, inscribe only the prince's name, with the year of the transmigration of their prophet.

As to the figure, it is either round, as in Britain; multangular or irregular, as in Spain; square, as in some parts of the Indies; or nearly globular, as in most of the rest.

After the arrival of the Romans in this island, the

Britons imitated them, coining both gold and silver with the images of their kings stamped on them. When the Romans had subdued the kings of the Britons, they also suppressed their coins, and brought in their own; which were current here from the time of Claudius to that of Valentinian the younger, about the space of 500 years.

Mr Camden observes, that the most ancient English coin he had known was that of Ethelbert king of Kent, the first Christian king in the island; in whose time all money-accounts begin to pass by the names of *pounds*, *shillings*, *pence*, and *manuces*. Pence seems borrowed from the Latin *pecunia*, or rather from *pendo*, on account of its just weight, which was about threepence of our money. These were coarsely stamped with the king's image on the one side, and either the mint-master's, or the city's where it was coined, on the other. Five of these pence made their schilling, probably so called from *scillingus*, which the Romans used for the fourth part of an ounce. Forty of these scillings made their pound; and 400 of these pounds were a legacy, or a portion for a king's daughter, as appears by the last will of king Alfred. By these names they translated all sums of money in their old English testament; talents by *pundes*; Judas's thirty pieces of silver by *thirtig scillinga*; tribute-money, by *penining*; the mite by *feorthling*.

But it must be observed, they had no other real money, but pence only; the rest being imaginary moneys, *i. e.* names of numbers or weights. Thirty of these pence made a mancus, which some take to be the same with a mark; manca, as appears by an old MS. was *quinta pars uncie*. These mancas or manuces were reckoned both in gold and silver. For in the year 680 we read that Ina king of the West Saxons obliged the Kentishmen to buy their peace at the price of 30,000 mancas of gold. In the notes on King Canute's laws, we find this distinction, that *mancusa* was as much as a mark of silver; and *manca* a square piece of gold, valued at 30 pence.

The Danes introduced a way of reckoning money by ores, *per oras*, mentioned in Domesday-book; but whether they were a several coin, or a certain sum, does not plainly appear. This, however, may be gathered from the Abbey-book of Burton, that 20 ores were equivalent to two marks. They had also a gold coin called *byzantine*, or *bezant*, as being coined at Constantinople, then called *Byzantium*. The value of which coin is not only now lost, but was so entirely forgot even in the time of King Edward III. that whereas the bishop of Norwich was fined a byzantine of gold to be paid the abbot of St Edmund's Bury for infringing his liberties (as it had been enacted by parliament in the time of the conqueror), no man then living could tell how much it was: so it was referred to the king to rate how much he should pay. Which is the more unaccountable, because but 100 years before, 200,000 bezants were exacted by the soldan for the ransom of St Louis of France; which were then valued at 100,000 livres.

Though the coining of money be a special prerogative of the king, yet the ancient Saxon princes communicated it to their subjects; insomuch that in every good town there was at least one mint; but at Lon-

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don eight; at Canterbury four for the king, two for the archbishop, one for the abbot at Winchester, six at Rochester, at Hastings two, &c.

The Norman kings continued the same custom of coining only pence, with the prince's image on one side, and on the other the name of the city where it was coined, with a cross so deeply impressed, that it might be easily parted and broke into two halves, which, so broken, they called *halfpence*; or into four parts, which they called *fourthings* or *farthings*.

In the time of King Richard I. money coined in the east parts of Germany came in special request in England on account of its purity, and was called *easterling money*, as all the inhabitants of those parts were called *Easterlings*. And shortly after, some of those people skilled in coining were sent for hither, to bring the coin to perfection; which since has been called *sterling* for *Easterling*. See *STERLING*.

King Edward I. who first adjusted the measure of an ell by the length of his arm, herein imitating Charles the Great, was the first also who established a certain standard for the coin, which is expressed to this effect by Greg. Rockley, mayor of London, and mint-master.—“A pound of money containeth twelve ounces: in a pound there ought to be eleven ounces, two *easterlings*, and one *farthing*; the rest alloy. The said pound ought to weigh twenty shillings and three pence in account and weight. The ounce ought to weigh twentypence, and a penny twenty-four grains and a half. Note, that eleven ounces two-pence *Sterling* ought to be of pure silver, called *leaf-silver*; and the minter must add of other weight seventeen-pence half-penny *farthing*, if the silver be so pure.”

About the year 1320, the states of Europe first began to coin gold; and among the rest, our King Edward III. The first pieces he coined were called *florences*, as being coined by Florentines; afterwards he coined nobles; then rose-nobles, current at 6s. and 8d. half-nobles called *half-pennies*, at 3s. and 4d. of gold; and quarters at 20d. called *farthings of gold*. The succeeding kings coined rose-nobles, and double rose-nobles, great sovereigns, and half Henry nobles, angels, and shillings.

King James I. coined units, double crowns, Britain crowns; then crowns, half-crowns, &c.

2. *Comparative value of Money and Commodities at different periods.* The English money, though the same names do by no means correspond with the same quantity of precious metal as formerly, has not changed so much as the money of most other countries. From the time of William the Conqueror, the proportion between the pound, the shilling, and the penny, seems to have been uniformly the same as at present.

Edward III. as already mentioned, was the first of our Kings that coined any gold; and no copper was coined by authority before James I. These pieces were not called *farthings*, but *farthing tokens*, and all people were at liberty to take or refuse them. Before the time of Edward III. gold was exchanged, like any other commodity, by its weight; and before the time of James I. copper was stamped by any one person who chose to do it.

In the year 712 and 727, an ewe and lamb were rated at 1s. Saxon money till a fortnight after Easter

Money.

Between the years 900 and 1000, two hydes of land, each containing about 120 acres, were sold for 100 shillings. In 1000, by King Ethelred's laws, a horse was rated at 30s. a mare or a colt of a year old, at 20s. a mule, or young ass, at 12s. an ox at 30s. a cow at 24s. a swine at 8d. a sheep at 1s. In 1043, a quarter of wheat was sold for 60d. Hence it is computed, that in the Saxon times there was ten times less money, in proportion to commodities, than at present. Their nominal specie, therefore, being about three times higher than ours, the price of every thing, according to our present language, must be reckoned thirty times cheaper than it is now.

In the reign of William the Conqueror, commodities were ten times cheaper than they are at present; from which we cannot help forming a very high idea of the wealth and power of that king: for his revenue was L. 400,000 per annum, every pound being equal to that weight of silver, consequently the whole may be estimated at L. 1,200,000 of the present computation; a sum which, considering the different value of money between that period and the present, was equivalent to L. 12,000,000 of modern estimation.

The most necessary commodities do not seem to have advanced their price from William the Conqueror to Richard I.

The price of corn in the reign of Henry III. was near half the mean price in our times. Bishop Fleetwood has shown, that in the year 1240, which was in this reign L. 4 : 13 : 9, was worth about L. 50 of our present money. About the latter end of this reign, Robert de Hay, rector of Souldern, agreed to receive 100s. to purchase to himself and successor the annual rent of 5s. in full compensation of an acre of corn.

Butchers meat, in the time of the great scarcity in the reign of Edward II. was, by a parliamentary ordinance, sold three times cheaper than our mean price at present; poultry somewhat lower, because being now considered as a delicacy, it has risen beyond its proportion. The mean price of corn at this period was half the present value, and the mean price of cattle one-eighth.

In the next reign, which was that of Edward III. the most necessary commodities were in general about three or four times cheaper than they are at present.

In these times, knights, who served on horseback in the army, had 2s. a-day, and a foot archer 6d. which last would now be equal to a crown a day. This pay has continued nearly the same nominally (only that in the time of the commonwealth the pay of the horse was advanced to 2s. 6d. and that of the foot 1s. though it was reduced again at the Restoration), but soldiers were proportionably of a better rank formerly.

In the time of Henry VI. corn was about half its present value, other commodities much cheaper. Bishop Fleetwood has determined, from a most accurate consideration of every circumstance, that L. 3 in this reign was equivalent to L. 28 or L. 30 now.

In the time of Henry VII. many commodities were three times as cheap here, and in all Europe, as they are at present, there having been a great increase of gold and silver in Europe since his time, occasioned by the discovery of America.

The

Money.

The commodities whose price has risen the most since before the time of Henry VII. are butchers meat, fowls, and fish, especially the latter. And the reason why corn was always much dearer in proportion to other eatables, according to their prices at present, is, that in early times agriculture was little understood. It required more labour and expence, and was more precarious, than it is at present. Indeed, notwithstanding the high price of corn in the times we are speaking of, the raising of it so little answered the expence, that agriculture was almost universally quitted for grasing; which was more profitable, notwithstanding the low price of butchers meat. So that there was constant occasion for statutes to restrain grasing, and to promote agriculture; and no effectual remedy was found till the bounty upon the exportation of corn; since which, above ten times more corn has been raised in this country than before.

The price of corn in the time of James I. and consequently that of other necessities of life, was not lower, but rather higher, than at present: wool is not two thirds of the value it was then; the finer manufactures having sunk in price by the progress of art and industry, notwithstanding the increase of money. Butchers meat was higher than at present. Prince Henry made an allowance of near 4d. per pound for all the beef and mutton used in his family. This may be true with respect to London; but the price of butchers meat in the country, which does not even now much exceed this price at a medium, has certainly greatly increased of late years, and particularly in the northern counties.

The prices of commodities are higher in England than in France; besides that the poor people of France live upon much less than the poor in England, and their armies are maintained at less expence. It is computed by Mr Hume, that a British army of 20,000 men is maintained at near as great an expence as 60,000 in France, and that the English fleet, in the war of 1741, required as much money to support it as all the Roman legions in the time of the emperors. However, all that we can conclude from this is, that money is much more plentiful in Europe at present than it was in the Roman empire.

In the 13th century the common interest which the Jews had for their money, Voltaire says, was 20 per cent. But with regard to this, we must consider the great contempt that nation was always held in, the large contributions they were frequently obliged to pay, the risk they run for never receiving the principal, the frequent confiscations of all their effects, and the violent persecutions to which they were exposed; in which circumstances it was impossible for them to lend money at all unless for most extravagant interest, and much disproportioned to its real value. Before the discovery of America and the plantation of our colonies, the interest of money was generally 12 per cent. all over Europe; and it has been growing gradually less since that time, till it is now generally about four or five.

When sums of money are said to be raised by a whole people, in order to form a just estimate of it, we must take into consideration not only the quantity of the precious metal according to the standard of the

coin, and the proportion of the quantity of coin to the commodities, but also the number and riches of the people who raise it: for populous and rich countries will much more easily raise any certain sum of money than one that is thinly inhabited, and chiefly by poor people. This circumstance greatly adds to our surprise at the vast sums of money raised by William the Conqueror, who had a revenue nearly in value equal to L. 12,000,000 of our money (allowance being made for the standard of coin and the proportion it bore to commodities), from a country not near so populous or rich as England is at present. Indeed, the accounts historians give us of the revenues of this prince, and the treasure he left behind him, are barely credible.

II. *IMAGINARY Money, or Money of Account*, is that which has never existed, or at least which does not exist in real specie, but is a denomination invented or retained to facilitate the stating of accounts, by keeping them still on a fixed footing, not to be changed, like current coins, which the authority of the sovereign raises or lowers according to the exigencies of the state. Of which kind are pounds, livres, marks, maravedies, &c. See the annexed Table, where the fictitious money is distinguished by a dagger (†).

Moneys of Account among the Ancients.—1. The Grecians reckoned their sums of money by *drachma*, *mina*, and *talenta*. The drachma was equal to 7½d. Sterling; 100 drachmæ made the mina, equal to 3l. 4s. 7d. Sterling; 60 minæ made the talent, equal to 193l. 15s. Sterling: hence 100 talents amounted to 19,375l. Sterling. The mina and talentum, indeed, were different in different provinces: their proportions in Attic drachms are as follow. The Syrian mina contained 25 Attic drachms; the Ptolemaic 33½; the Antiochic and Eubæan 100; the Babylonian 116; the greater Attic and Tyrian 133½; the Ægean and Rhodian 166½. The Syrian talent contained 15 Attic minæ; the Ptolemaic 20; the Antiochic 60; the Eubæan 60; the Babylonian 70; the greater Attic and Tyrian 80; the Ægean and Rhodian 100.

2. Roman moneys of account were the *sestertius* and *sestertium*. The sestertius was equal to 1d. 3¼q. Sterling. One thousand of these made the sestertium, equal to 8l. 1s. 5d. 2q. Sterling. One thousand of these sestertia made the decies sestertium (the adverb *centies* being always understood) equal to 8072l. 18s. 4d. Sterling. The decies sestertium they also called *decies centena millia nummum*. Centies sestertium, or centies HS, were equal to 80,729l. 3s. 4d. Millies HS to 807,291l. 13s. 4d. Millies centies HS to 888,020l. 16s. 8d.

THEORY OF MONEY.

I. Of Artificial or Material Money.

I. As far back as our accounts of the transactions of mankind reach, we find they had adopted the precious metals, that is, silver and gold, as the common measure of value, and as the adequate equivalent for every thing alienable.

The metals are admirably adapted for this purpose: they are perfectly homogeneous: when pure, their

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masses, or bulks, are exactly in proportion to their weights: no physical difference can be found between two pounds of gold, or silver, let them be the production of the mines of Europe, Asia, Africa, or America: they are perfectly malleable, fusible, and suffer the most exact division which human art is capable to give them: they are capable of being mixed with one another, as well as with metals of a baser, that is, of a less homogeneous nature, such as copper: by this mixture they spread themselves uniformly through the whole mass of the composed lump, so that every atom of it becomes proportionally possessed of a share of this noble mixture; by which means the subdivision of the precious metals is rendered very extensive.

Their physical qualities are invariable: they lose nothing by keeping; they are solid and durable; and though their parts are separated by friction, like every other thing, yet still they are of the number of those which suffer least by it.

If money, therefore, can be made of any thing, that is, if the proportional value of things vendible can be measured by any thing material, it may be measured by the metals.

II. The two metals being pitched upon as the most proper substances for realising the ideal scale of money, those who undertake the operation of adjusting a standard, must constantly keep in their eye the nature and qualities of a scale, as well as the principles upon which it is formed.

The unit of the scale must constantly be the same, although realised in the metals, or the whole operation fails in the most essential part. This realising the unit is like adjusting a pair of compasses to a geometrical scale, where the smallest deviation from the exact opening once given must occasion an incorrect measure. The metals, therefore, are to money what a pair of compasses is to a geometrical scale.

This operation of adjusting the metals to the money of account implies an exact and determinate proportion of both metals to the money-unit, realised in all the species and denominations of coin, adjusted to that standard.

The smallest particle of either metal added to, or taken away from, any coins, which represent certain determinate parts of the scale, overturns the whole system of material money. And if, notwithstanding such variation, these coins continue to bear the same denominations as before, this will as effectually destroy their usefulness in measuring the value of things, as it would overturn the usefulness of a pair of compasses, to suffer the opening to vary, after it is adjusted to the scale representing feet, toises, miles or leagues, by which the distances upon the plan are to be measured.

III. Debasing the standard is a good term; because it conveys a clear and distinct idea. It is diminishing the weight of the pure metal contained in that denomination by which a nation reckons, and which we have called the *money-unit*. Raising the standard requires no farther definition, being the direct contrary.

IV. Altering the standard (that is, raising or debasing the value of the money-unit) is like altering the national measures or weights. This is best discovered
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by comparing the thing altered with things of the same nature which have suffered no alteration. Thus, if the foot of measure was altered at once over all England, by adding to it, or taking from it, any proportional part of its standard length, the alteration would be best discovered by comparing the new foot with that of Paris, or of any other country, which had suffered no alteration. Just so, if the pound Sterling, which is the English unit, shall be found any how changed, and if the variation it has met with be difficult to ascertain because of a complication of circumstances, the best way to discover it, will be to compare the former and the present value of it with the money of other nations which has suffered no variation. This the course of exchange will perform with the greatest exactness.

V. Artists pretend, that the precious metals, when absolutely pure from any mixture, are not of sufficient hardness to constitute a solid and lasting coin. They are found also in the mines mixed with other metals of a baser nature; and the bringing them to a state of perfect purity occasions an unnecessary expence. To avoid, therefore, the inconvenience of employing them in all their purity, people have adopted the expedient of mixing them with a determinate proportion of other metals, which hurts neither their fusibility, malleability, beauty, or lustre. This metal is called *alloy*; and, being considered only as a support to the principal metal, is accounted of no value in itself. So that eleven ounces of gold, when mixed with one ounce of silver, acquires by that addition no augmentation of value whatever.

This being the case, we shall, as much as possible, overlook the existence of alloy, in speaking of money, in order to render language less subject to ambiguity.

2. Incapacities of the Metals to perform the Office of an invariable Measure of Value.

I. WERE there but one species of such a substance as we have represented gold and silver to be; were there but one metal possessing the qualities of purity, divisibility, and durability; the inconveniences in the use of it for money would be fewer by far than they are found to be as matters stand.

Such a metal might then, by an unlimited division into parts exactly equal, be made to serve as a tolerably steady and universal measure. But the rivalry between the metals, and the perfect equality which is found between all their physical qualities, so far as regards purity and divisibility, render them so equally well adapted to serve as the common measure of value, that they are universally admitted to pass current as money.

What is the consequence of this? that the one measures the value of the other, as well as that of every other thing. Now the moment any measure begins to be measured by another, whose proportion to it is not physically, perpetually, and invariably the same, all the usefulness of such a measure is lost. An example will make this plain.

A foot of measure is a determinate length. An English foot may be compared with the Paris foot, or with that of the Rhine; that is to say, it may be measured by them: and the proportion between their
lengths

Money. lengths may be expressed in numbers; which proportion will be the same perpetually. The measuring the one by the other will occasion no uncertainty; and we may speak of length by Paris feet, and be perfectly well understood by others who are used to measure by the English foot, or by the foot of the Rhine.

But suppose that a youth of 12 years old takes it into his head to measure from time to time, as he advances in age, by the length of his own foot, and that he divides this growing foot into inches and decimals: what can be learned from his account of measures? As he increases in years, his foot, inches, and subdivisions, will be gradually lengthening; and were every man to follow his example, and measure by his own foot, then the foot of a measure now established would totally cease to be of any utility.

This is just the case with the two metals. There is no determinate invariable proportion between their value; and the consequence of this is, that when they are both taken for measuring the value of other things, the things to be measured, like lengths to be measured by the young man's foot, without changing their relative proportion between themselves, change, however, with respect to the denominations of both their measures. An example will make this plain.

Let us suppose an ox to be worth 3000 pounds weight of wheat, and the one and the other to be worth an ounce of gold, and an ounce of gold to be worth exactly 15 ounces of silver: if the case should happen, that the proportional value between gold and silver should come to be as 14 is to 1, would not the ox, and consequently the wheat, be estimated at less in silver, and more in gold, than formerly? Farther, would it be in the power of any state to prevent this variation in the measure of the value of oxen and wheat, without putting into the unit of their money less silver and more gold than formerly?

If therefore any particular state should fix the standard of the unit of their money to one species of the metals, while in fact both the one and the other are actually employed in measuring value; does not such a state resemble the young man who measures all by his growing foot? For if silver, for example, be retained as the standard, while it is gaining upon gold one fifteenth additional value; and if gold continue all the while to determine the value of things as well as silver; it is plain, that, to all intents and purposes, this silver-measure is lengthening daily like the young man's foot, since the same weight of it must become every day equivalent to more and more of the same commodity; notwithstanding that we suppose the same proportion to subsist, without the least variation, between that commodity and every other species of things alienable.

Buying and selling are purely conventional, and no man is obliged to give his merchandise at what may be supposed to be the proportion of its worth. The use, therefore, of an universal measure, is to mark, not only the relative value of the things to which it is applied as a measure, but to discover in an instant the proportion between the value of those, and of every other commodity valued by a determinate measure in all the countries of the world.

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Were pounds Sterling, livres, florins, piaſtres, &c. which are all money of account, invariable in their values, what a facility would it produce in all conversions, what an assistance to trade! But as they are all limited or fixed to coins, and consequently vary from time to time, this example shows the utility of the invariable measure which we have described.

There is another circumstance which incapacitates the metals from performing the office of money; the substance of which the coin is made, is a commodity which rises and sinks in its value with respect to other commodities, according to the wants, competition, and caprices of mankind. The advantage, therefore, found in putting an intrinsic value into that substance which performs the function of money of account, is compensated by the instability of that intrinsic value; and the advantage obtained by the stability of paper, or symbolical money, is compensated by the defect it commonly has of not being at all times susceptible of realization into solid property or intrinsic value.

In order, therefore, to render material money more perfect, this quality of metal, that is, of a commodity, should be taken from it; and in order to render paper-money more perfect, it ought to be made to circulate upon metallic or land-security.

II. There are several smaller inconveniences accompanying the use of the metals, which we shall here shortly enumerate.

1^{mo}, No money made of gold or silver can circulate long, without losing its weight, although it all along preserves the same denomination. This represents the contracting a pair of compasses which had been rightly adjusted to the scale.

2^{do}, Another inconvenience proceeds from the fabrication of money. Supposing the faith of princes who coin money to be inviolable, and the probity as well as capacity of those to whom they commit the inspection of the business of the metals to be sufficient, it is hardly possible for workmen to render every piece exactly of a proper weight, or to preserve the due proportion between pieces of different denominations; that is to say, to make every ten sixpences exactly of the same weight with every crown-piece and every five shillings struck in a coinage. In proportion to such inaccuracies, the parts of the scale become unequal.

3^{tho}, Another inconvenience, and far from being inconsiderable, flows from the expence requisite for the coining of money. This expence adds to its value as a manufacture, without adding any thing to its weight.

4^{tho}, The last inconvenience is, that by fixing the money of account entirely to the coin, without having any independent common measure, (to mark and control these deviations from mathematical exactness, which are either inseparable from the metals themselves, or from the fabrication of them), the whole measure of value, and all the relative interests of debtors and creditors, become at the disposal not only of workmen in the mint, of Jews who deal in money, of clippers and washers in coin; but they are also entirely at the mercy of princes, who have the right of coinage, and who have frequently also the right of

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raising

Money. raising or debasing the standard of the coin, according as they find it most for their present and temporary interest.

3. *Methods which may be proposed for lessening the several Inconveniences to which Material Money is liable.*

THE inconveniences from the variation in the relative value of the metals to one another, may in some measure be obviated by the following expedients.

1^{mo}, By considering one only as the standard, and leaving the other to seek its own value like any other commodity.

2^{do}, By considering one only as the standard, and fixing the value of the other from time to time by authority, according as the market-price of the metals shall vary.

3^{tio}, By fixing the standard of the unit according to the mean proportion of the metals, attaching it to neither; regulating the coin accordingly; and upon every considerable variation in the proportion between them, either to make a new coinage, or to raise the denomination of one of the species, and lower it in the other, in order to preserve the unit exactly in the mean proportion between the gold and silver.

4^{to}, To have two units and two standards, one of gold and one of silver, and to allow every body to stipulate in either.

5^{to}, Or last of all, to oblige all debtors to pay one half in gold, and one half in the silver standard.

4. *Variations to which the Value of the Money-unit is exposed from every Disorder in the Coin.*

LET us suppose, at present, the only disorder to consist in a want of the due proportion between the gold and silver in the coin.

This proportion can only be established by the market-price of the metals; because an augmentation and rise in the demand for gold or silver has the effect of augmenting the value of the metal demanded. Let us suppose, that to-day one pound of gold may buy fifteen pounds of silver: If to-morrow there be a high demand for silver, a competition among merchants to have silver for gold will ensue: they will contend who shall get the silver at the rate of 15 pounds for one of gold: this will raise the price of it; and in proportion to their views of profit, some will accept of less than the 15 pounds. This is plainly a rise in the silver, more properly than a fall in the gold; because it is the competition for the silver which has occasioned the variation in the former proportion between the metals.

Let us now suppose, that a state, having with great exactness examined the proportion of the metals in the market, and having determined the precise quantity of each for realising or representing the money-unit, shall execute a most exact coinage of gold and silver coin. As long as that proportion continues unvaried in the market, no inconvenience can result from that quarter in making use of metals for money of account.

But let us suppose the proportion to change: that the silver, for example, shall rise in its value with regard to gold: will it not follow, from that moment,

that the unit realized in the silver, will become of more value than the unit realized in the gold coin?

But as the law has ordered them to pass as equivalents for one another, and as debtors have always the option of paying in what legal coin they think fit, will they not all choose to pay in gold? and will not then the silver coin be melted down or exported, in order to be sold as bullion, above the value it bears when it circulates in coin? Will not this paying in gold also really diminish the value of the money-unit, since upon this variation every thing must sell for more gold than before, as we have already observed.

Consequently, merchandise, which have not varied in their relative value to any other thing but to gold and silver, must be measured by the mean proportion of the metals; and the application of any other measure to them is altering the standard. If they are measured by the gold, the standard is debased; if by silver, it is raised.

If, to prevent the inconvenience of melting down the silver, the state shall give up affixing the value of their unit to both species at once, and shall fix it to one, leaving the other to seek its price as any other commodity; in that case, no doubt, the melting down of the coin will be prevented; but will this ever restore the value of the money-unit to its former standard? Would it, for example, in the foregoing supposition, raise the debased value of the money-unit in the gold coin, if that species were declared to be the standard? It would indeed render silver coin purely a merchandise, and, by allowing it to seek its value, would certainly prevent it from being melted down as before; because the pieces would rise conventionally in their denomination; or an *agio*, as it is called, would be taken in payments made in silver: but the gold would not, on that account, rise in its value, or begin to purchase any more merchandise than before. Were therefore the standard fixed to the gold, would not this be an arbitrary and a violent revolution in the value of the money-unit, and a debasement of the standard?

If, on the other hand, the state should fix the standard to the silver, which we suppose to have risen in its value, would that ever sink the advanced value which the silver coin had gained above the worth of the former standard unit? and would not this be a violent and an arbitrary revolution in the value of the money-unit, and a raising of the standard?

The only expedient, therefore, is, in such a case, to fix the numerary unit to neither of the metals, but to contrive a way to make it fluctuate in a mean proportion between them; which is in effect the introduction of a pure ideal money of account.

The regulation of fixing the unit by the mean proportion, ought to take place at the instant the standard unit is fixed with exactness both to the gold and silver. If it be introduced long after the market-proportion between the metals has deviated from the proportion established in the coin; and if the new regulation is made to have a retrospect, with regard to the acquitting of permanent contracts entered into while the value of the money-unit had attached itself to the lowest currency in consequence of the principle above laid

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Money. laid down; then the restoring the money-unit to that standard where it ought to have remained (to wit, to the mean proportion) is an injury to all debtors who have contracted since the time that the proportion of the metals began to vary.

This is clear from the former reasoning. The moment the market price of the metals differs from that in the coin, every one who has payments to make, pays in that species which is the highest rated in the coin; consequently, he who lends, lends in that species. If after the contract, therefore, the unit is carried up to the mean proportion, this must be a loss to him who had borrowed.

From this we may perceive, why there is less inconvenience from the varying of the proportion of the metals, where the standard is fixed to one of them, than when it is fixed to both. In the first case, it is at least uncertain whether the standard or the merchandise species is to rise; consequently it is uncertain whether the debtors or the creditors are to gain by a variation. If the standard species should rise, the creditors will gain; if the merchandise species rises, the debtors will gain; but when the unit is attached to both species, then the creditors never can gain, let the metals vary as they will; if silver rises, then debtors will pay in gold; if gold rises, the debtors will pay in silver. But whether the unit be attached to one or to both species, the infallible consequence of a variation is, that one half of the difference is either gained or lost by debtors and creditors. The invariable unit is constantly the mean proportional between the two measures.

5. *How the Variations of the intrinsic Value of the Unit of Money must affect all the domestic Interest of a Nation.*

If the changing the content of the bushel by which grain is measured, would affect the interest of those who are obliged to pay, or who are entitled to receive, a certain number of bushels of grain for the rent of lands; in the same manner must every variation in the value of the unit of account affect all persons who, in permanent contracts, are obliged to make payments, or who are obliged to receive sums of money stipulated in multiples or in fractions of that money-unit.

Every variation, therefore, upon the intrinsic value of the money-unit, has the effect of benefiting the class of creditors at the expence of debtors, or *vice versa*.

This consequence is deduced from an obvious principle. Money is more or less valuable in proportion as it can purchase more or less of every kind of merchandise. Now, without entering anew into the causes of the rise and fall of prices, it is agreed upon all hands, that whether an augmentation of the general mass of money in circulation has the effect of raising prices in general, or not, any augmentation of the quantity of the metals appointed to be put into the money-unit, must at least affect the value of that money-unit, and make it purchase more of any commodity than before: that is to say, 113 grains of fine gold, the present weight of a pound Sterling in gold, can buy 113 pounds of flour; were

the pound Sterling raised to 114 grains of the same metal, it would buy 114 pounds of flour; consequently, were the pound Sterling augmented by one grain of gold, every miller who paid a rent of ten pounds a year, would be obliged to sell 1140 pounds of his flour, in order to procure ten pounds to pay his rent, in place of 1130 pounds of flour, which he sold formerly to procure the same sum; consequently, by this innovation, the miller must lose yearly ten pounds of flour, which his master consequently must gain. From this example, it is plain, that every augmentation of metals put into the pound Sterling, either of silver or gold, must imply an advantage to the whole class of creditors who are paid in pounds Sterling, and consequently must be a proportional loss to all debtors who must pay by the same denomination.

6. *Of the Disorder in the British Coin, so far as it occasions the melting down or the exporting of the Specie.*

THE defects in the British coin are three.

1^{mo}, The proportion between the gold and silver in it is found to be as 1 to 15 $\frac{1}{3}$, whereas the market price may be supposed to be nearly as 1 to 14 $\frac{1}{2}$.

2^{do}, Great part of the current money is worn and light.

3^{tio}, From the second defect proceeds the third, to wit, that there are several currencies in circulation which pass for the same value, without being of the same weight.

4^{to}, From all these defects results the last and greatest inconvenience, to wit, that some innovation must be made, in order to set matters on a right footing.

The English, besides the unit of their money which they call the pound Sterling, have also the unit of their weight for weighing the precious metals.

This is called the *pound troy*, and consists of 12 ounces, every ounce of 20 penny-weights, and every penny-weight of 24 grains. The pound troy, therefore, consists of 240 penny-weights and 5760 grains.

The fineness of the silver is reckoned by the number of ounces and penny-weights of the pure metal in the pound troy of the composed mass; or, in other words, the pound troy, which contains 5760 grains of standard silver, contains 5328 grains of fine silver, and 432 grains of copper, called *alloy*.

Thus standard silver is 11 ounces 2 penny-weights of fine silver in the pound troy to 18 penny-weights copper, or 111 parts fine silver to 9 parts alloy.

Standard gold is 11 ounces fine to 1 ounce silver or copper employed for alloy, which together make the pound troy; consequently, the pound troy of standard gold contains 5280 grains fine, and 480 grains alloy, which alloy is reckoned of no value.

This pound of standard silver is ordered, by statute of the 43d of Elizabeth, to be coined into 62 shillings, 20 of which make the pound sterling; consequently the 20 shillings contain 1718.7 grains of fine silver, and 1858.06 standard silver.

The pound troy of standard gold, $\frac{1}{12}$ fine, is ordered, by an act of king Charles II. to be cut into 44 $\frac{1}{2}$ guineas; that is to say, every guinea contains 129.43 grains of standard gold, and 118.644 of fine gold;

Money. and the pound Sterling, which is $\frac{1}{20}$ of the guinea, contains 112.994, which we may state at 113 grains of fine gold.

The coinage in England is entirely defrayed at the expence of the state. The mint price for the metals is the very same with the price of the coin. Whoever carries to the mint an ounce of standard silver, receives for it in silver coin 5 s. 2 d. or 62 d. : whoever carries an ounce of standard gold receives in gold coin 3 l. 17 s. 10 $\frac{1}{2}$ d. the one and the other making exactly an ounce of the same fineness with the bullion. Coin, therefore, can have no value in the market above bullion ; consequently, no loss can be incurred by those who melt it down.

When the guinea was first struck, the government (not inclining to fix the pound Sterling to the gold coin of the nation) fixed the guinea at 20 shillings, (which was then below its proportion to the silver), leaving it to seek its own price above that value, according to the course of the market.

By this regulation no harm was done to the English silver standard ; because the guinea, or 118.644 grains fine gold being worth more, at that time, than 20 shillings, or 1718.7 grains fine silver, no debtor would pay with gold at its standard value ; and whatever it was received for above that price was purely conventional.

Accordingly guineas sought their own price until the year 1728, that they were fixed a-new, not below their value as at first, but as what was then reckoned their exact value, according to the proportion of the metals, viz. at 21 shillings ; and at this they were ordered to pass current in all payments.

This operation had the effect of making the gold a standard as well as the silver. Debtors then paid indifferently in gold as well as in silver, because both were supposed to be of the same intrinsic as well as current value ; in which case no inconvenience could follow upon this regulation. But in time silver came to be more demanded ; the making of plate began to prevail more than formerly, and the exportation of silver to the East Indies increasing yearly, made the demand for it greater, or perhaps brought its quantity to be proportionally less than before. This changed the proportion of the metals ; and by slow degrees they have come from that of 1 to 15.2 (the proportion they were supposed to have when the guineas were fixed and made a lawful money at 21 shillings) to that of 14.5, the present *supposed* proportion.

The consequence of this has been, that the same guinea which was worth 1804.6 grains fine silver, at the time it was fixed at 21 s. is now worth more than 1719.9 grains of fine silver according to the proportion of 14 $\frac{1}{2}$ to 1.

Consequently debtors, who have always the option of the legal species in paying their debts, will pay pounds sterling no more in silver but in gold ; and as the gold pounds they pay in are not intrinsically worth the silver pounds they paid in formerly according to the statute of Elisabeth, it follows that the pound Sterling in silver is really no more the standard, since nobody will pay at that rate, and since nobody can be compelled to do it.

Besides this want of proportion between the metals, the silver coined before the reign of George I. is now

Money. become light by circulation ; and the guineas coined by all the princes since Charles II. pass by tale, though many of them are considerably diminished in their weight.

Let us now examine what profit the want of proportion and the want of weight in the coin can afford to the money-jobbers in melting it down or exporting it.

Did every body consider coin only as the measure for reckoning value, without attending to its value as a metal, the deviations of gold and silver coin from perfect exactness, either as to proportion or weight, would occasion little inconvenience.

Great numbers, indeed, in every modern society, consider coin in no other light than that of money of account ; and have great difficulty to comprehend what difference any one can find between a light shilling and a heavy one, or what inconvenience there can possibly result from a guinea's being some grains of fine gold too light to be worth 21 shillings standard weight. And did every one think in the same way, there would be no occasion for coin of the precious metals at all ; leather, copper, iron, or paper, would keep the reckoning as well as gold and silver.

But although there be many who look no farther than at the stamp on the coin, there are others whose sole business it is to examine its intrinsic worth as a commodity, and to profit of every irregularity in the weight and proportion of metals.

By the very institution of coinage, it is implied, that every piece of the same metal, and some denomination with regard to the money-unit, shall pass current for the same value.

It is, therefore, the employment of money-jobbers, to examine, with a scrupulous exactness, the precise weight of every piece of coin which comes into their hands.

The first object of their attention is, the price of the metals in the market : a jobber finds, at present, that with 14.5 pounds of fine silver bullion, he can buy one pound of fine gold bullion.

He therefore buys up with gold coin all the new silver as fast as it is coined, of which he can get at the rate of 15.2 pounds for one in gold ; these 15.2 pounds silver coin he melts down into bullion, and converts that back into gold bullion, giving at the rate of only 14.5 pounds for one.

By this operation he remains with the value of $\frac{7}{10}$ of one pound weight of silver bullion clear profit upon the 15 $\frac{1}{2}$ pounds he bought ; which $\frac{7}{10}$ is really lost by the man who inadvertently coined silver at the mint, and gave it to the money-jobber for his gold. Thus the state loses the expence of the coinage, and the public the convenience of change for their guineas.

But here it may be asked, Why should the money-jobber melt down the silver coin ? can he not buy gold with it as well without melting it down ? He cannot ; because when it is in coin he cannot avail himself of its being new and weighty. Coin goes by tale, not by weight ; therefore, were he to come to market with his new silver coin, gold bullion being sold at the mint price, we shall suppose, viz. at 3 l. 17 s. 10 $\frac{1}{2}$ d. Sterling money *per* ounce, he would be obliged to pay the price of what he bought with heavy money, which he can equally do with light.

He therefore melts down the new silver coin, and
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Money. sells it for bullion, at so many pence an ounce; the price of which bullion is, in the English market, always above the price of silver at the mint, for the reasons now to be given.

When you sell standard-silver bullion at the mint, you are to be paid in weighty money; that is, you receive for your bullion the very same weight in standard coin; the coinage cost nothing: but when you sell bullion in the market, you are paid in worn out silver, in gold, in bank-notes, in short, in every species of lawful current money. Now all these payments have some defect: the silver you are paid with is worn and light; the gold you are paid with is over-rated, and perhaps also light; and the bank-notes must have the same value with the specie with which the bank pays them; that is, with light silver or over-rated gold.

It is for these reasons, that silver bullion, which is bought by the mint at 5s. 2d. *per* ounce of heavy silver money, may be bought at market at 65 pence the ounce in light silver, over-rated gold, or bank-notes, which is the same thing.

Further, we have seen how the imposition of coinage has the effect of raising coin above the value of bullion, by adding a value to it which it had not as a metal.

Just so, when the unit is once affixed to certain determined quantities of both metals, if one of the metals should afterwards rise in value in the market, the coin made of that metal must lose a part of its value as coin, although it retains it as a metal. Consequently, as in the first case it acquired an additional value by being coined, it must now acquire an additional value by being melted down. From this we may conclude, that when the standard is affixed to both the metals in the coin, and when the proportion of that value is not made to follow the price of the market, that species which rises in the market is melted down, and the bullion is sold for a price as much exceeding the mint price as the metal has risen in its value.

If, therefore, in England, the price of silver bullion is found to be at 65 pence the ounce, while at the mint it is rated at 62; this proves that silver has risen $\frac{3}{8}$ above the proportion observed in the coin, and that all coin of standard weight may consequently be melted down with a profit of $\frac{3}{8}$. But as there are several other circumstances to be attended to which regulate and influence the price of bullion, we shall here pass them in review, the better to discover the nature of this disorder in the English coin, and the advantages which money-jobbers may draw from it.

The price of bullion, like that of every other merchandise, is regulated by the value of the money it is paid with.

If bullion, therefore, sells in England for 65 pence an ounce, paid in silver coin, it must sell for 65 shillings the pound troy; that is to say, the shillings it is commonly paid with do not exceed the weight of $\frac{1}{8}$ of a pound troy: for if the 65 shillings with which the pound of bullion is paid weighed more than a pound troy, it would be a shorter and better way for him who wants bullion to melt down the shillings and make use of the metal, than to go to market with them in order to get less.

We may, therefore, be very certain, that no man

will buy silver bullion at 65 pence an ounce, with any shilling which weighs above $\frac{1}{8}$ of a pound troy.

We have gone upon the supposition that the ordinary price of bullion in the English market is 65 pence *per* ounce. This has been done upon the authority of some late writers on this subject: it is now proper to point out the causes which may make it deviate from that value.

I. It may vary, and certainly will vary, in the price, according as the currency is better or worse. When the expences of a war, or a wrong balance of trade, have carried off a great many heavy guineas, it is natural that bullion should rise; because then it will be paid for more commonly in light gold and silver; that is to say, with pounds Sterling, below the value of 113 grains fine gold, the worth of the pound Sterling in new guineas.

II. This wrong balance of trade, or a demand for bullion abroad, becoming very great, may occasion a scarcity of the metals in the market, as well as a scarcity of the coin; consequently, an advanced price must be given for it in proportion to the greatness and height of the demand. In this case, both the specie and the bullion must be bought with paper. But the rise in the price of bullion proceeds from the demand for the metals and the competition between merchants to procure them, and not because the paper given as the price is at all of inferior value to the specie. The least discredit of this kind would not tend to diminish the value of the paper; it would annihilate it at once. Therefore, since the metals must be had, and that the paper cannot supply the want of them when they are to be exported, the price rises in proportion to the difficulties in finding metals elsewhere than in the English market.

III. A sudden call for bullion, for the making of plate. A goldsmith can well afford to give 67 pence for an ounce of silver, that is to say, he can afford to give one pound of gold for 14 pounds of silver, and perhaps for less, notwithstanding that what he gives be more than the ordinary proportion between the metals, because he indemnifies himself amply by the price of his workmanship; just as a tavern-keeper will pay any price for a fine fish, because, like the goldsmith, he buys for other people.

IV. The mint price has as great an effect in bringing down the price of bullion, as exchange has in raising it. In countries where the metals in the coin are justly proportioned, where all the currencies are of legal weight, and where coinage is imposed, the operations of trade make the price of bullion constantly to fluctuate between the value of the coin and the mint-price of the metals.

Now let us suppose that the current price of silver bullion in the market is 65 pence the ounce, paid in lawful money, no matter of what weight or of what metal. Upon this the money-jobber falls to work. All shillings which are above $\frac{1}{8}$ of a pound troy, he throws into his melting pot, and sells them as bullion for 65d. *per* ounce; all those which are below that weight he carries to market, and buys bullion with them at 65d. *per* ounce.

What is the consequence of this?

That those who sell the bullion, finding the shillings which the money-jobber pays with perhaps not above $\frac{1}{8}$ of

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$\frac{1}{80}$ of a pound troy, they on their side raise the price of their bullion to 66d. the ounce.

This makes new work for the money-jobber; for he must always gain. He now weighs all shillings as they come to hand; and as formerly he threw into his melting-pot those only which were worth more than $\frac{1}{80}$ of a pound troy, he now throws in all that are in value above $\frac{1}{80}$. He then sells the melted shillings at 66d. the ounce, and buys bullion with the light ones at the same price.

This is the consequence of ever permitting any species of coin to pass by the authority of the stamp, without controlling it at the same time by the weight: and this is the manner in which money-jobbers gain by the currency of light money.

It is no argument against this exposition of the matter to say, that silver bullion is seldom bought with silver coin; because the pence in new guineas are worth no more than the pence of shillings of 65 in the pound troy: that is to say, that 240 pence contained in $\frac{1}{2}$ of a new guinea, and 240 pence contained in 28 shillings of 65 to the pound troy, differ no more in the intrinsic value than 0.83 of a grain of fine silver upon the whole, which is a mere trifle.

Whenever, therefore, shillings come below the weight of $\frac{1}{80}$ of a pound troy, then there is an advantage in changing them for new guineas; and when that is the case, the new guineas will be melted down, and profit will be found in selling them for bullion, upon the principles we have just been explaining.

We have already given a specimen of the domestic operations of the money-jobbers; but these are not the most prejudicial to national concerns. The jobbers may be supposed to be Englishmen; and in that case the profit they make remains at home: but whenever there is a call for bullion to pay the balance of trade, it is evident that this will be paid in silver coin; never in gold, if heavy silver can be got; and this again carries away the silver coin, and renders it at home so rare, that great inconveniences are found for want of the lesser denominations of it. The loss, however, here is confined to an inconvenience; because the balance of trade being a debt which must be paid, we do not consider the exportation of the silver for that purpose as any consequence of the disorder of the coin. But besides this exportation which is necessary, there are others which are arbitrary, and which are made only with a view to profit of the wrong proportion.

When the money-jobbers find difficulty in carrying on the traffic we have described, in the English market, because of the competition among themselves, they carry the silver coin of the country, and sell it abroad for gold, upon the same principles that the East India company send silver to China in order to purchase gold.

It may be demanded, What hurt this trade can do to Britain, since those who export silver bring back the same value in gold? Were this trade carried on by natives, there would be no loss; because they would bring home gold for the whole intrinsic value of the silver. But if we suppose foreigners sending over gold to be coined at the English mint, and changing the gold into English silver coin, and then carrying off this coin, it is plain that they must gain the difference, as well as the money-jobbers. But

it may be answered, That having given gold for silver at the rate of the mint, they have given value for what they have received. Very right; but so did Sir Hans Sleane, when he paid five guineas for an overgrown toad: he got value for his money; but it was value only to himself. Just so, whenever the English government shall be obliged to restore the proportion of the metals (as they must do), this operation will annihilate that imaginary value which they have hitherto set upon gold; which imagination is the only thing which renders the exchange of their silver against the foreign gold equal.

But it is farther objected, that foreigners cannot carry off the heavy silver; because there is none to carry off. Very true; but then they have carried off a great quantity already: or if the English Jews have been too sharp to allow such a profit to fall to strangers, (which may or may not have been the case), then this disorder is an effectual stop to any more coinage of silver for circulation.

7. *Of the Disorder in the British Coin, so far as it affects the Value of the Pound Sterling Currency.*

From what has been said, it is evident, that there must be found in England two legal pounds Sterling, of different values; the one worth 113 grains of fine gold, the other worth 1718.7 grains of fine silver. We call them different; because these two portions of the precious metals are of different values all over Europe.

But besides these two different pounds Sterling, which the change in the proportion of the metals have created, the other defects of the circulating coin produce similar effects. The guineas coined by all the princes since King Charles II. have been of the same standard weight and fineness, $44\frac{1}{2}$ in a pound troy of standard gold $\frac{1}{12}$ fine: these have been constantly wearing ever since they have been coined; and in proportion to their wearing they are of less value.

If, therefore, the new guineas are below the value of a pound Sterling in silver, standard weight, the old must be of less value still. Here then is another currency, that is, another pound Sterling; or indeed, more properly speaking, there are as many different pounds Sterling as there are guineas of different weights. This is not all; the money-jobbers having carried off all the weighty silver, that which is worn with use, and reduced even below the standard of gold, forms one currency more, and totally destroys all determinate proportion between the money-unit and the currencies which are supposed to represent it.

It may be asked, how, at this rate, any silver has remained in England? It is answered, that the few weighty shillings which still remain in circulation, have marvellously escaped the hands of the money-jobbers: and as to the rest, the rubbing and wearing of these pieces has done what the state might have done; that is to say, it has reduced them to their due proportion with the lightest gold.

The disorder, therefore, of the English coin has rendered the standard of a pound Sterling quite uncertain. To say that it is 1718.7 grains of fine silver, is quite ideal. Who are paid in such pounds? To say that it is 113 grains of pure gold, may also not be true; because there are many currencies worse than the new guineas.

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What

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What then is the consequence of all this disorder? What effect has it upon the current value of a pound Sterling? And which way can the value of that be determined?

The operations of trade bring value to an equation, notwithstanding the greatest irregularities possible; and so in fact a pound Sterling has acquired a determinate value over all the world by the means of foreign exchange. This is a kind of ideal scale for measuring the British coin, although it has not all the properties of that described above.

Exchange considers the pound Sterling as a value determined according to the combination of the values of all the different currencies, in proportion as payments are made in the one or the other; and as debtors generally take care to pay in the worst species they can, it consequently follows, that the value of the pound Sterling should fall to that of the lowest currency.

Were there a sufficient quantity of worn gold and silver to acquit all bills of exchange, the pound Sterling would come down to the value of them; but if the new gold be also necessary for that purpose, the value of it must be proportionally greater.

All these combinations are liquidated and compensated with one another, by the operations of trade and exchange: and the pound Sterling, which is so different in itself, becomes thereby, in the eyes of commerce, a determinate unit; subject, however, to variations, from which it never can be exempted.

Exchange, therefore, is one of the best measures for valuing a pound Sterling, present currency. Here occurs a question:

Does the great quantity of paper-money in England tend to diminish the value of the pound Sterling?

We answer in the negative. Paper money is just as good as gold or silver money, and no better. The variation of the standard, as we have already said, must influence the interests of debtors and creditors proportionally every where. From this it follows, that all augmentation of the value of the money-unit in the specie must hurt the debtors in the paper money; and all diminutions, on the other hand, must hurt the creditors in the paper money as well as every where else. The payments, therefore, made in paper money, never can contribute to the regulation of the standard of the pound Sterling; it is the specie received in liquidation of that paper money which alone can contribute to mark the value of the British unit; because it is affixed to nothing else.

From this we may draw a principle, "That in countries where the money-unit is entirely affixed to the coin, the actual value of it is not according to the legal standard of that coin, but according to the mean proportion of the actual worth of those currencies in which debts are paid.

From this we see the reason why the exchange between England and all other trading towns in Europe has long appeared so unfavourable. People calculate the real par, upon the supposition that a pound Sterling is worth 1718.7 grains troy of fine silver, when in fact the currency is not perhaps worth 1638, the value of a new guinea in silver, at the market proportion of 1 to 14.5; that is to say, the currency is but 95.3 per cent. of the silver standard of the 43d of Elizabeth.

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No wonder then if the exchange be thought unfavourable.

From the principle we have just laid down, we may gather a confirmation of what we advanced concerning the cause of the advanced price of bullion in the English market.

When people buy bullion with current money at a determinate price, that operation, in conjunction with the course of exchange, ought naturally to mark the actual value of the pound Sterling with great exactness.

If therefore the price of standard bullion in the English market, when no demand is found for the exportation of the metals, that is to say, when paper is found for paper upon exchange, and when merchants versed in these matters judge exchange (that is, remittances) to be at par, if then silver bullion cannot be bought at a lower price than 65 pence the ounce, it is evident that this bullion might be bought with 65 pence in shillings, of which 65 might be coined out of the pound troy English standard silver; since 65 per ounce implies 65 shillings for the 12 ounces or pound troy.

This plainly shows how standard silver bullion should sell for 65 pence the ounce, in a country where the ounce of standard silver in the coin is worth no more than 62; and were the market-price of bullion to stand uniformly at 65 pence per ounce, that would show the value of the pound Sterling to be tolerably fixed. All the heavy silver coin is now carried off; because it was intrinsically worth more than the gold it passed for in currency. The silver therefore which remains is worn down to the market proportion of the metals, as has been said; that is to say, 20 shillings in silver currency are worth 113 grains of fine gold, at the proportion of 1 to 14.5 between gold and silver. Now,

as 1 is to 14.5, so is 113 to 1638:

so the 20 shillings current weigh but 1638 grains fine silver, instead of 1718.7, which they ought to do according to the standard.

Now let us speak of standard silver, since we are examining how far the English coin must be worn by use.

The pound troy contains 5760 grains. This, according to the standard, is coined into 62 shillings; consequently, every shilling ought to weigh 92.9 grains. Of such shillings it is impossible that ever standard bullion should sell at above 62 pence per ounce. If therefore such bullion sells for 65 pence, the shillings with which it is bought must weigh no more than 88.64 grains standard silver; that is, they must lose 4.29 grains, and are reduced to $\frac{1}{5}$ of a pound troy.

But it is not necessary that bullion be bought with shillings; no stipulation of price is ever made farther, than at so many pence Sterling per ounce. Does not this virtually determine the value of such currency with regard to all the currencies in Europe? Did a Spaniard, a Frenchman, or a Dutchman, know the exact quantity of silver bullion which can be bought in the London market for a pound Sterling, would he inform himself any farther as to the intrinsic value of that money-unit; would he not understand the value of it far better from that circumstance than by the course

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course of any exchange, since exchange does not mark the intrinsic value of money, but only the value of that money transported from one place to another?

The price of bullion, therefore, when it is not influenced by extraordinary demand, (such as for the payment of a balance of trade, or for making an extraordinary provision of plate), but when it stands at what every body knows to be meant by the common market price, is a very tolerable measure of the value of the actual money-standard in any country.

If it be therefore true, that a pound Sterling cannot purchase above 1638 grains of fine silver bullion, it will require not a little logic to prove that it is really, or has been for these many years, worth any more; notwithstanding that the standard weight of it in England is regulated by the laws of the kingdom at 1718.7 grains of fine silver.

If to this valuation of the pound Sterling drawn from the price of bullion, we add the other drawn from the course of exchange; and by this we find, that when paper is found for paper upon exchange, a pound Sterling cannot purchase above 1638 grains of fine silver in any country in Europe: upon these two authorities we may very safely conclude (as to the matter of fact at least) that the pound Sterling is not worth more, either in London or in any other trading city; and if this be the case, it is just worth 20 shillings of 65 to the pound troy.

If therefore the mint were to coin shillings at that rate, and pay for silver bullion at the market price, that is, at the rate of 65 pence per ounce in those new coined shillings, they would be in proportion to the gold; silver would be carried to the mint equally with gold, and would be as little subject to be exported or melted down.

It may be inquired in this place, how far the coining the pound troy into 65 shillings is contrary to the laws of England?

The moment a state pronounces a certain quantity of gold to be worth a certain quantity of silver, and orders these respective quantities of each metal to be received as equivalents of each other, and as lawful money in payments, that moment gold is made a standard as much as silver. If therefore too small a quantity of gold be ordered or permitted to be considered as an equivalent for the unit, the silver standard is from that moment debased; or indeed, more properly speaking, all silver money is from that moment proscribed; for who, from that time, will ever pay in silver, when he can pay cheaper in gold? Gold, therefore, by such a law, is made the standard, and all declarations to the contrary are against the matter of fact.

Were the king, therefore, to coin silver at 65 shillings in the pound, it is demonstration, that by such an act he would commit no adulteration upon the standard: the adulteration is already committed. The standard has descended to where it is by slow degrees, and by the operation of political causes only; and nothing prevents it from falling lower but the standard of the gold coin. Let guineas be now left to seek their value as they did formerly, and let light silver continue to go by tale, we shall see the guineas up at 30 shillings in 20 years time, as was the case in 1695.

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It is as absurd to say that the standard of Queen Elizabeth has not been debased by enacting that the English unit shall be acquitted with 113 grains of fine gold, as it would be to affirm that it would not be debased from what it is at present by enacting that a pound of butter should every where be received in payment for a pound Sterling; although the pound Sterling should continue to consist of 3 ounces, 17 penny-weights, and 10 grains of standard silver, according to the statute of the 43d of Elizabeth. In that case, most debtors would pay in butter; and silver would, as at present, acquire a conventional value as a metal, but would be looked upon no longer as a standard, or as money.

If therefore, by the law of England, a pound Sterling must consist of 1718.7 grains troy of fine silver; by the law of England also, 113 grains of gold must be of the same value: but no law can establish that proportion; consequently, in which ever way a reformation be brought about, some law must be reversed; consequently, expediency, and not compliance with law, must be the motive in reforming the abuse.

From what has been said, it is not at all surprising that the pound Sterling should in fact be reduced nearly to the value of the gold. Whether it ought to be kept at that value is another question. All that we here decide is, that coining the pound troy into 65 shillings would restore the proportion of the metals, and render both species common in circulation. But restoring the weight and proportion of the coin is not the difficulty which prevents a reformation of the English coinage.

8. *Circumstances to be attended to in a new Regulation of the British Coin.*

To people who do not understand the nature of such operations, it may have an air of justice to support the unit at what is commonly believed to be the standard of Queen Elizabeth, viz. at 1718.7 grains of fine silver.

The regulating the standard of both silver and gold to $\frac{1}{12}$ fine, and the pound Sterling to four ounces standard silver, as it stood during the reign of Queen Mary I. has also its advantages, as Mr Harris has observed. It makes the crown-piece to weigh just one ounce, the shilling four penny-weight, and the penny eight grains; consequently, were the new statute to bear, that the weight of the coin should regulate its currency upon certain occasions, the having the pieces adjusted to certain aliquot parts of weight would make weighing easy, and would accustom the common people to judge of the value of money by its weight, and not by the stamp.

In that case, there might be a conveniency in striking the gold coins of the same weight with the silver; because the proportion of their values would then constantly be the same with the proportion of the metals. The gold crowns would be worth at present, 3l. 12s. 6d. the half crowns 1l. 16s. 3d. the gold shillings 14s. and 6d. and the half 7s. and 3d. This was anciently the practice in the Spanish mints.

The interests within the state can be nowise perfectly protected but by permitting conversions of value from the old to the new standard, whatever it be, and by

Money. by regulating the footing of such conversations by act of parliament, according to circumstances.

For this purpose, we shall examine those interests which will chiefly merit the attention of government, when they form a regulation for the future of acquitting permanent contracts already entered into. Such as may be contracted afterwards will naturally follow the new standard.

The landed interest is no doubt the most considerable in the nation. Let us therefore examine, in the first place, what regulations it may be proper to make, in order to do justice to this great class, with respect to the land-tax on one hand, and with respect to their lessees on the other.

The valuation of the lands of England was made many years ago, and reasonably ought to be supported at the real value of the pound Sterling at that time, according to the principles already laid down. The general valuation, therefore, of the whole kingdom will rise according to this scheme. This will be considered as an injustice; and no doubt it would be so, if, for the future, the land-tax be imposed as heretofore, without attending to this circumstance; but as that imposition is annual, as it is laid on by the landed interest itself, who compose the parliament, it is to be supposed that this great class will at least take care of their own interest.

Were the valuation of the lands to be stated according to the valuation of the pound Sterling of 1718.7 grains of silver, which is commonly supposed to be the standard of Elizabeth, there would be no great injury done: this would raise the valuation only 5 per cent. and the land-tax in proportion.

There is no class of inhabitants in all England so much at their ease, and so free from taxes, as the class of farmers. By living in the country, and by consuming the fruits of the earth without their suffering any alienation, they avoid the effect of many excises, which, by those who live in corporations, are felt upon many articles of their consumption, as well as on those which are immediately loaded with these impositions. For this reason it will not, perhaps, appear unreasonable, if the additional 5 per cent. on the land-tax were thrown upon this class, and not upon the landlords.

With respect to leases, it may be observed, that we have gone upon the supposition that the pound Sterling in the year 1728 was worth 1718.7 grains of fine silver, and 113 grains of fine gold.

There would be no injustice done the lessees of all the lands in the kingdom, were their rents to be fixed at the mean proportion of these values. We have observed how the pound Sterling has been gradually diminishing in its worth from that time by the gradual rise of the silver. This mean proportion, therefore, will nearly answer to what the value of the pound Sterling was in 1743; supposing the rise of the silver to have been uniform.

It may be farther alleged in favour of the landlords, that the gradual debasement of the standard has been more prejudicial to their interest in letting their lands, than to the farmers in disposing of the fruits of them. Proprietors cannot so easily raise their rents upon new leases, as farmers can raise the prices of their grain

according to the debasement of the value of the currency.

The pound Sterling, thus regulated at the mean proportion of its worth, as it stands at present, and as it stood in 1728, may be realised in 1678.6 grains of fine silver, and 115.76 grains fine gold; which is 2.4 per cent. above the value of the present currency. No injury, therefore, would be done to lessees, and no unreasonable gain would accrue to the landed interest, in appointing conversions of all land-rents at $2\frac{1}{2}$ per cent. above the value of the present currency.

Without a thorough knowledge of every circumstance relating to Great Britain, it is impossible to lay down any plan. It is sufficient here briefly to point out the principles upon which it must be regulated.

The next interest to be considered is that of the nation's creditors. The right regulation of their concerns will have a considerable influence in establishing public credit upon a solid basis, by making it appear to all the world, that no political operation upon the money of Great Britain can in any respect either benefit or prejudice the interest of those who lend their money upon the faith of the nation. The regulating also the interest of so great a body, will serve as a rule for all creditors who are in the same circumstances, and will upon other accounts be productive of greater advantages to the nation in time coming.

In 1749, a new regulation was made with the public creditors, when the interest of the whole redeemable national debt was reduced to 3 per cent. This circumstance infinitely facilitates the matter with respect to this class, since, by this innovation of all former contracts, the whole national debt may be considered as contracted at, or posterior to, the 25th of December 1749.

Were the state, by any arbitrary operation upon money (which every reformation must be), to diminish the value of the pound Sterling in which the parliament at that time bound the nation to acquit those capitals and the interest upon them, would not all Europe say, That the British parliament had defrauded their creditors? If therefore the operation proposed to be performed should have a contrary tendency, viz. to augment the value of the pound Sterling with which the parliament at that time bound the nation to acquit those capitals and interests, must not all Europe also agree, That the British parliament had defrauded the nation?

This convention with the ancient creditors of the state, who, in consequence of the debasement of the standard, might have justly claimed an indemnification for the loss upon their capitals, lent at a time when the pound Sterling was at the value of the heavy silver, removes all causes of complaint from that quarter. There was in the year 1749 an innovation in all their contracts; and they are now to be considered as creditors only from the 25th of December of that year.

Let the value of the pound Sterling be inquired into during one year preceding and one posterior to the transaction of the month of December 1749. The great sums borrowed and paid back by the nation during that period, will furnish data sufficient for that calculation. Let this value of the pound be specified

Money. in troy grains of fine silver and fine gold bullion, without mentioning any denomination of money according to the exact proportion of the metals at that time. And let this pound be called the *pound of national credit*.

This first operation being determined, let it be enacted, that the pound Sterling, by which the state is to borrow for the future, and that in which the creditors are to be paid, shall be the exact mean proportion between the quantities of gold and silver above specified, according to the actual proportion of the metals at the time such payments shall be made: or that the sums shall be borrowed or acquitted, one half in gold and one half in silver, at the respective requisitions of the creditors or of the state, when borrowing. All debts contracted posterior to 1749 may be made liable to conversions.

The consequence of this regulation will be the insensible establishment of a bank-money. Nothing would be more difficult to establish, by a positive revolution, than such an invariable measure; and nothing will be found so easy as to let it establish itself by its own advantages. This bank-money will be liable to much fewer inconveniences than that of Amsterdam. There the persons transacting must be upon the spot; here, the Sterling currency may, every quarter of a year, be adjusted by the exchequer to this invariable standard, for the benefit of all debtors and creditors who incline to profit of the stability of this measure of value.

This scheme is liable to no inconvenience from the variation of the metals, let them be ever so frequent or hard to be determined; because upon every occasion where there is the smallest doubt as to the actual proportion, the option competent to creditors to be paid half in silver and half in gold will remove.

Such a regulation will also have this good effect, that it will give the nation more just ideas of the nature of money, and consequently of the influence it ought to have upon prices.

If the value of the pound Sterling shall be found to have been by accident less in December 1749 than it is at present; or if at present the currency be found below what has commonly been since 1749; in justice to the creditors, and to prevent all complaints, the nation may grant them the mean proportion of the value of the pound Sterling from 1749 to 1760, or any other which may to parliament appear reasonable.

This regulation must appear equitable in the eyes of all Europe; and the strongest proof of it will be, that it will not produce the smallest effect prejudicial to the interest of the foreign creditors. The course of exchange with regard to them will stand precisely as before.

A Dutch, French, or German creditor, will receive the same value for his interest in the English stocks as heretofore. This must silence all clamours at home, being the most convincing proof, that the new regulation of the coin will have made no alteration upon the real value of any man's property, let him be debtor or creditor.

The interest of every other denomination of credi-

tors, whose contracts are of a fresh date, may be regulated upon the same principles. But where debts are of an old standing, justice demands, that attention be had to the value of money at the time of contracting. Nothing but the stability of the English coin, when compared with that of other nations, can make such a proposal appear extraordinary. Nothing is better known in France than this stipulation added to obligations, *Argent au cours de ce jour*; that is to say, That the sum shall be repaid in coin of the same intrinsic value with what has been lent. Why should such a clause be thought reasonable for guarding people against arbitrary operations upon the numerary value of the coin, and not be found just upon every occasion where the numerary value of it is found to be changed, let the cause be what it will?

The next interest we shall examine is that of trade. When men have attained the age of 21, they have no more occasion for guardians. This may be applied to traders; they can parry with their pen every inconvenience which may result to other people from the changes upon money, provided only the laws permit them to do themselves justice with respect to their engagements. This class demands no more than a right to convert all reciprocal obligations into denominations of coin of the same intrinsic value with those they have contracted in.

The next interest is that of buyers and sellers; that is, of manufacturers with regard to consumers, and of servants with respect to those who hire their personal service.

The interest of this class requires a most particular attention. They must, literally speaking, be put to school, and taught the first principles of their trade, which is buying and selling. They must learn to judge of price by the grains of silver and gold they receive: they are children of a mercantile mother, however warlike the father's disposition. If it be the interest of the state that their bodies be rendered robust and active, it is no less the interest of the state that their minds be instructed in the first principles of the trade they exercise.

For this purpose, tables of conversion from the old standard to the new must be made, and ordered to be put up in every market, in every shop. All duties, all excises, must be converted in the same manner. Uniformity must be made to appear every where. The smallest deviation from this will be a stumbling-block to the multitude.

Not only the interest of the individuals of the class we are at present considering, demands the nation's care and attention in this particular; but the prosperity of trade, and the well-being of the nation, are also deeply interested in the execution.

The whole delicacy of the intricate combinations of commerce depends upon a just and equable vibration of prices, according as circumstances demand it. The more, therefore, the industrious classes are instructed in the principles which influence prices, the more easily will the machine move. A workman then learns to sink his price without regret, and can raise it without avidity. When principles are not understood, prices cannot gently fall, they must be pulled down; and merchants dare not suffer them to rise, for fear of abuse,

even

Money. even although the perfection of an infant manufacture should require it.

The last interest is that of the bank of England, which naturally must regulate that of every other.

Had this great company followed the example of other banks, and established a bank-money of an invariable standard as the measure of all their debts and credits, they would not have been liable to any inconvenience upon a variation of the standard.

The bank of England was projected about the year 1694, at a time when the current money of the nation was in the greatest disorder, and government in the greatest distress both for money and for credit. Commerce was then at a very low ebb; and the only, or at least the most profitable, trade of any, was jobbing in coin, and carrying backwards and forwards the precious metals from Holland to England. Merchants profited also greatly from the effects which the utter disorder of the coin produced upon the price of merchandise.

At such a juncture the resolution was taken to make a new coinage; and upon the prospect of this, a company was found, who, for an exclusive charter to hold a bank for 13 years, willingly lent the government upwards of a million Sterling at 8 *per cent.* (in light money we suppose), with a prospect of being repaid both interest and capital in heavy. This was not all: part of the money lent was to be applied for the establishment of the bank; and no less than 4000*l.* a-year was allowed to the company, above the full interest, for defraying the charge of the management.

Under such circumstances the introduction of bank-money was very superfluous, and would have been very impolitic. That invention is calculated against the raising of the standard: but here the bank profited of that rise in its quality of creditor for money lent; and took care not to commence debtor by circulating their paper until the effect of the new regulation took place in 1695; that is, after the general re-coinage of all the clipped silver.

From that time till now, the bank of England has been the basis of the nation's credit, and with great reason has been constantly under the most intimate protection of every minister.

The value of the pound Sterling, as we have seen, has been declining ever since the year 1601, the standard being fixed to silver during all that century, while the gold was constantly rising. No sooner had the proportion taken another turn, and silver begun to rise, than the government of England threw the standard virtually upon the gold, by regulating the value of the guineas at the exact proportion of the market. By these operations, however, the bank has constantly been a gainer (in its quality of debtor) upon all the paper in circulation; and therefore has lost nothing by not having established a bank-money.

The interest of this great company being established upon the principles we have endeavoured to explain, it is very evident, that the government of England never will take any step in the reformation of the coin which in its consequences can prove hurtful to the bank. Such a step would be contrary both to justice and to common sense. To make a regulation which, by raising the standard, will prove beneficial to the public creditors, to the prejudice of the bank (which

we may call the *public debtor*), would be an operation upon public credit like that of a person who is at great pains to support his house by props upon all sides, and who at the same time blows up the foundation of it with gunpowder.

We may therefore conclude, that with regard to the bank of England, as well as every other private banker, the notes which are constantly payable upon demand must be made liable to a conversion at the actual value of the pound Sterling at the time of the new regulation.

That the bank will gain by this, is very certain; but the circulation of their notes is so swift, that it would be absurd to allow to the then possessors of them that indemnification which naturally should be shared by all those through whose hands they have passed, in proportion to the debasement of the standard during the time of their respective possession.

Besides these considerations, which are in common to all states, the government of Great Britain has one peculiar to itself. The interest of the bank, and that of the creditors, are diametrically opposite: every thing which raises the standard hurts the bank; every thing which can sink it hurts the creditors: and upon the right management of the one and the other, depends the solidity of public credit. For these reasons, without the most certain prospect of conducting a restitution of the standard to the general advantage as well as approbation of the nation, no minister will probably ever undertake so dangerous an operation.

We shall now propose an expedient which may remove at least some of the inconveniences which would result from so extensive an undertaking as that of regulating the respective interests in Great Britain by a positive law, upon a change in the value of their money of account.

Suppose then, that, before any change is made in the coin, government should enter into a transaction with the public creditors, and ascertain a permanent value for the pound sterling for the future, specified in a determined proportion of the fine metals in common bullion, without any regard to money of account, or to any coin whatever.

This preliminary step being taken, let the intended alteration of the standard be proclaimed a certain time before it is to commence. Let the nature of the change be clearly explained, and let all such as are engaged in contracts which are dissolvable at will upon the prestations stipulated, be acquitted between the parties, or innovated as they shall think proper; with certification, that, posterior to a certain day, the stipulations formerly entered into shall be binding according to the denominations of the money of account in the new standard.

As to permanent contracts, which cannot at once be fulfilled and dissolved, such as leases, the parliament may either prescribe the methods and terms of conversion; or a liberty may be given to the parties to annul the contract, upon the debtor's refusing to perform his agreement according to the new standard. Contracts, on the other hand, might remain stable, with respect to creditors who would be satisfied with payments made on the footing of the old standard. If the rise intended should not be very considerable, no great injustice can follow such a regulation.

Money.

Annuities are now thoroughly understood, and the value of them is brought to so nice a calculation, that nothing will be easier than to regulate these upon the footing of the value paid for them, or of the subject affected by them. If by the regulation, land-rents are made to rise in denomination, the annuities charged upon them ought to rise in proportion; if in intrinsic value, the annuity should remain as it was.

9. *Regulations which the Principles of this Inquiry point out as expedient to be made by a new Statute for regulating the British Coin.*

LET us now examine what regulations it may be proper to make by a new statute concerning the coin of Great Britain, in order to preserve always the same exact value of the pound Sterling realized in gold and in silver, in spite of all the incapacities inherent in the metals to perform the functions of an invariable scale or measure of value.

1. The first point is to determine the exact number of grains of fine gold and fine silver which are to compose it, according to the then proportion of the metals in the London market.

2. To determine the proportion of these metals with the pound troy; and in regard that the standard of gold and silver is different, let the mint price of both metals be regulated according to the pound troy fine.

3. To fix the mint price within certain limits; that is to say, to leave to the king and council, by proclamation, to carry the mint price of bullion up to the value of the coin, as is the present regulation, or to sink it to *per cent.* below that price, according as government shall incline to impose a duty upon coinage.

4. To order, that silver and gold coin shall be struck of such denominations as the king shall think fit to appoint; in which the proportion of the metals above determined shall be constantly observed through every denomination of the coin, until necessity shall make a new general coinage unavoidable.

5. To have the number of grains of the fine metal in every piece marked upon the exergue, or upon the legend of the coin, in place of some initial letters of titles, which not one person in a thousand can decypher; and to make the coin of as compact a form as possible, diminishing the surface of it as much as is consistent with beauty.

6. That it shall be lawful for all contracting parties to stipulate their payments either in gold or silver coin, or to leave the option of the species to one of the parties.

7. That where no particular stipulation is made, creditors shall have power to demand payment, half in one species, half in the other; and when the sum cannot fall equally into gold and silver coins, the fractions to be paid in silver.

8. That in buying and selling, when no particular species has been stipulated, and when no act in writing has intervened, the option of the species shall be competent to the buyer.

9. That all sums paid or received by the king's receivers, or by bankers, shall be delivered by weight, if demanded.

10. That all money which shall be found under the

legal weight, from whatever cause it may proceed, may be rejected in every payment whatsoever; or if offered in payment of a debt above a certain sum, may be taken according to its weight, at the then mint price, in the option of the creditor.

11. That no penalty shall be incurred by those who melt down or export the nation's coin; but that washing, clipping, or diminishing the weight of any part of it shall be deemed felony, as much as any other theft, if the person so degrading the coin shall afterwards make it circulate for lawful money.

To prevent the inconveniences proceeding from the variation in the proportion between the metals, it may be provided,

12. That upon every variation of proportion in the market-price of the metals, the price of both shall be changed, according to the following rule:

Let the price of the pound troy fine gold in the coin be called *G*.

Let the price of ditto in the silver be called *S*.

Let the new proportion between the market-price of the metals be called *P*.

Then state this formula:

$\frac{G}{2P} + \frac{S}{2} = \text{to a pound troy fine silver, in Sterling currency.}$

$\frac{S}{2} + P + \frac{G}{2} = \text{to a pound troy fine gold, in Sterl. currency.}$

This will be a rule for the mint to keep the price of the metals constantly at par with the price of the market; and coinage may be imposed, as has been described, by fixing the mint price of them at a certain rate below the value of the fine metals in the coin.

13. As long as the variation of the market-price of the metals shall not carry the price of the rising metal so high as the advanced price of the coin above the bullion, no alteration need be made on the denomination of either species.

14. So soon as the variation of the market price of the metals shall give a value to the rising species, above the difference between the coin and the bullion; then the king shall alter the denominations of all the coin, silver and gold, adding to the coins of the rising metal exactly what is taken from those of the other. An example will make this plain:

Let us suppose that the coinage has been made according to the proportion of 14.5 to 1; that 20 shillings, or 4 crown-pieces, shall contain, in fine silver, 14.5 times as many grains as the guinea, or the gold pound, shall contain grains of fine gold. Let the new proportion of the metals be supposed to be 14 to 1. In that case, the 20 shillings, or the 4 crowns, will contain $\frac{1}{20}$ more value than the guinea. Now since there is no question of making a new general coinage upon every variation, in order to adjust the proportion of the metals in the weight of the coins, that proportion might be adjusted by changing their respective denominations according to this formula:

Let the 20 shillings, or 4 crowns, in coin, be called *S*. Let the guinea be called *G*. Let the difference between the old proportion and the new, which is $\frac{1}{20}$, be called *P*. Then say,

$S - \frac{P}{2} = \text{a pound sterling, and } G + \frac{P}{2} = \text{a pound sterl.}$

By this it appears that all the silver coin must be raised

Money.

Money. raised in its denomination $\frac{1}{8}$, and all the gold coin must be lowered in its denomination $\frac{1}{8}$; yet still S + G will be equal to two pounds Sterling, as before, whether they be considered according to the old or according to the new denominations.

But it may be observed, that the imposition of coinage rendering the value of the coin greater than the value of the bullion, that circumstance gives a certain latitude in fixing the new denominations of the coin, so as to avoid minute fractions. For, providing the deviation from the exact proportion shall fall within the advanced price of the coin, no advantage can be taken by melting down one species preferably to another; since, in either case, the loss incurred by melting the coin must be greater than the profit made upon selling the bullion. The mint price of the metals, however, may be fixed exactly, that is, within the value of a farthing upon a pound of fine silver or gold. This is easily reckoned at the mint; although upon every piece in common circulation the fractions of farthings would be inconvenient.

15. That notwithstanding of the temporary variations made upon the denomination of the gold and silver coins, all contracts formerly entered into, and all stipulations in pounds shillings and pence, may continue to be acquitted according to the old denominations of the coins, paying one-half in gold and one-half in silver: unless in the case where a particular species has been stipulated; in which case, the sums must be paid according to the new regulation made upon the denomination of that species, to the end that neither profit or loss may result to any of the parties.

16. That notwithstanding the alterations on the mint price of the metals, and in the denomination of the coins, no change shall be made upon the weight of the particular pieces of the latter, except in the case of a general re-coinage of one denomination at least: that is to say, the mint must not coin new guineas, crowns, &c. of a different weight from those already in currency, although by so doing the fractions might be avoided. This would occasion confusion, and the remedy would cease to be of any use upon a new change in the proportion of the metals. But it may be found convenient, for removing the small fractions in shillings and sixpences, to recoin such denominations altogether, and to put them to their integer numbers, of twelve and of six pence, without changing in any respect their proportion of value to all other denominations of the coin: this will be no

great expence, when the bulk of the silver coin is put into 5 shilling pieces.

By this method of changing the denominations of the coin, there never can result any alteration in the value of the pound Sterling; and although fractions of value may now and then be introduced, in order to prevent the abuses to which the coin would otherwise be exposed by the artifice of those who melt it down, yet still the inconvenience of such fractions may be avoided in paying, according to the old denominations, in both species, by equal parts. This will also prove demonstratively, that no change is thereby made in the true value of the national unit of money.

17. That it be ordered, that shillings and sixpences shall only be current for 20 years; and all other coins, both gold and silver, for 40 years, or more. For ascertaining which term, there may be marked, upon the exergue of the coin, the last year of their currency, in place of the date of their fabrication. This term elapsed, or the date effaced, that they shall have no more currency whatsoever; and, when offered in payment, may be received as bullion at the actual price of the mint, or refused, at the option of the creditor.

18. That no foreign coin shall have any legal currency, except as bullion at the mint price.

By these and the like regulations may be prevented, 1^{mo}, The melting or exporting of the coin in general. 2^{do}, The melting or exporting one species, in order to sell it as bullion at an advanced price. 3^{tio}, The profit in acquitting obligations preferably in one species to another. 4^{to}, The degradation of the standard, by the wearing of the coin, or by a change in the proportion between the metals. 5^{to}, The circulation of the coin below the legal weight. 6^{to}, The profit that other nations reap by paying their debts more cheaply to Great Britain than Great Britain can pay her's to them.

And the great advantage of it is, that it is an uniform plan, and may serve as a perpetual regulation, compatible with all kinds of denominations of coins, variations in the proportion of the metals, and with the imposition of a duty upon coinage, or with the preserving it free; and further, that it may in time be adopted by other nations, who will find the advantage of having their money of account preserved perpetually at the same value, with respect to the denominations of all foreign money of account established on the same principles.

A TABLE

A T A B L E O F C O I N S,

Showing the Quantity of Fine Metal contained in them.

The number of grains of fine metal in every coin is sought for in the regulations of the mint of the country where it is coined, and is expressed in the grains in use in that mint. From that weight it is converted into those of other countries according to the following proportions:

3840 Troy grains, 4676.35 Paris grains, 5192.8 Holland aces or grains, and 4649.06 Colonia grains, are supposed to be equal weights; and the coins in the Table are converted according to those proportions.

M O N

Table of Coins, reduced to Grains of fine Metal, according to the Troy, Paris, Colonia, and Holland weights.

1 A Guinea by statute	—	—	—	—
2 A Crown by statute	—	—	—	—
3 A Shilling by statute	—	—	—	—
4 A Silver Pound Sterling by statute 1601	—	—	—	—
5 A Gold Pound Sterling by statute 1728	—	—	—	—
6 A Silver Pound Sterling in currency = $\frac{1}{12}$ lb. Troy	—	—	—	—
7 A Silver pound Sterl. at the proportion of gold to silver as 1 to 14 $\frac{1}{2}$	—	—	—	—
8 A Gold Pound Sterling at the same proportion of 1 to 14 $\frac{1}{2}$	—	—	—	—
9 A Pound Sterling at the mean proportion in gold and in silver	—	—	—	—
10 A Shilling current = $\frac{1}{20}$ of a pound Troy	—	—	—	—
11 A Guinea in Silver, or 21 Shillings standard weight	—	—	—	—
12 A Guinea at the proportion of 1 to 14 $\frac{1}{2}$, worth in Silver	—	—	—	—
13 A Pound Troy, or 12 ounces English weight	—	—	—	—

English Coins.

French Coins.

M O N

Dutch Coins. German Coins.

1 A Carolin legal weight	—	—	—	—
2 A Ducat of the Empire ditto	—	—	—	—
3 A Florin of Convention	—	—	—	—
4 A Dollar of Convention	—	—	—	—
5 A Dollar of Exchange, the Carolin = 9 flor. 42 kreutzers	—	—	—	—
6 A Florin current = $\frac{1}{17}$ of a Carolin	—	—	—	—
7 A Carolin in silver, at the proportion of 1 to 14 $\frac{1}{2}$	—	—	—	—
1 A Dutch Ducat	—	—	—	—
2 A Florin in Silver	—	—	—	—

GOLD COINS.

SILVER COINS.

	Troy.	Paris.	Colonia.	Holland.	Troy.	Paris.	Colonia.	Holland.
1 A Guinea by statute	118.651	144.46	143.65	160.45	429.68	523.2	520.2	581.
2 A Crown by statute	—	—	—	—	85.935	104.65	104.	116.2
3 A Shilling by statute	—	—	—	—	1718.7	2093.	2080.8	2324.1
4 A Silver Pound Sterling by statute 1601	113.	137.61	136.8	152.8	1639.38	1996.4	1984.7	2216.
5 A Gold Pound Sterling by statute 1728	—	—	—	—	1638.5	1995.3	1983.7	2215.7
6 A Silver Pound Sterling in currency = $\frac{1}{12}$ lb. Troy	113.	137.61	136.8	152.8	1718.7	2093.	2080.8	2324.1
7 A Silver pound Sterl. at the proportion of gold to silver as 1 to 14 $\frac{1}{2}$	118.4	144.18	143.34	160.11	1678.6	2044.2	2032.2	2269.9
8 A Gold Pound Sterling at the same proportion of 1 to 14 $\frac{1}{2}$	115.769	140.98	140.16	156.55	81.961	99.8	99.	110.82
9 A Pound Sterling at the mean proportion in gold and in silver	—	—	—	—	1804.6	2197.6	2184.8	2440.3
10 A Shilling current = $\frac{1}{20}$ of a pound Troy	—	—	—	—	1720.4	2095.1	2082.8	2326.4
11 A Guinea in Silver, or 21 Shillings standard weight	—	—	—	—	—	—	—	—
12 A Guinea at the proportion of 1 to 14 $\frac{1}{2}$, worth in Silver	5760.	7019.2	6973.5	7789.2	—	—	—	—
13 A Pound Troy, or 12 ounces English weight	—	—	—	—	—	—	—	—
1 A Louis d'or	113.27	137.94	137.13	153.17	409.94	499.22	496.3	554.3
2 A Crown of six livres	—	—	—	—	204.97	249.61	248.15	277.1
3 A Crown of three ditto	—	—	—	—	68.34	83.23	82.74	92.42
4 A livre	—	—	—	—	1639.7	1996.9	1985.2	2217.4
5 A Louis d'or, or 24 livres in silver	3783.87	4608.	4581.1	5116.9	3783.87	4608.	4581.1	5116.9
6 A Marc of Paris weight, fine gold or silver	3398.3	4138.5	4114.3	4593.4	—	—	—	—
7 A Marc of gold coin effective weight, in fine	—	—	—	—	3402.3	4143.4	4119.2	4600.9
8 A Marc of silver coin effective weight, in fine	—	—	—	—	—	—	—	—
1 A Carolin legal weight	115.45	140.6	139.78	156.12	—	—	—	—
2 A Ducat of the Empire ditto	52.8	64.37	64.	71.48	—	—	—	—
3 A Florin of Convention	—	—	—	—	179.73	218.87	217.6	243.
4 A Dollar of Convention	—	—	—	—	269.59	328.31	326.4	364.5
5 A Dollar of Exchange, the Carolin = 9 flor. 42 kreutzers	17.85	21.74	21.615	24.14	—	—	—	—
6 A Florin current = $\frac{1}{17}$ of a Carolin	10.54	12.84	12.77	14.26	—	—	—	—
7 A Carolin in silver, at the proportion of 1 to 14 $\frac{1}{2}$	—	—	—	—	1674.	2038.6	2026.8	2263.8
1 A Dutch Ducat	51.76	6.3	62.67	70.	—	—	—	—
2 A Florin in Silver	—	—	—	—	148.	180.3	179.2	200.21

UNIVERSAL TABLE

Of the present State of the REAL and IMAGINARY MONIES of the World.

† This mark is prefixed to the Imaginary Money, or Money of Account.

All Fractions in the Value English are Parts of a PENNY.

= This mark signifies is, make, or equal to.

ENGLAND AND SCOTLAND.

*London, Bristol, Liverpool, &c.**Edinburgh, Glasgow, Aberdeen, &c.*

		£.	s.	d.
A Farthing		0	0	$\frac{1}{4}$
2 Farthings	= a Halfpenny	0	0	$\frac{1}{2}$
2 Halfpence	a Penny	0	0	1
4 Pence	a Groat	0	0	4
6 Pence	a Half Shilling	0	0	6
12 Pence	a Shilling	0	1	0
5 Shillings	a Crown	0	5	0
20 Shillings	† a Pound Sterling	1	0	0
21 Shillings	a Guinea	1	1	0

IRELAND.

Dublin, Cork, Londonderry, &c.

A Farthing		0	0	$\frac{3}{4}$
2 Farthings	= a Halfpenny	0	0	$\frac{3}{4}$
2 Halfpence	† a Penny	0	0	$\frac{3}{4}$
6½ Pence	a Half Shilling	0	0	6
12 Pence	† a Shilling Irish	0	0	$1\frac{3}{4}$
13 Pence	a Shilling	0	1	0
65 Pence	a Crown	0	5	0
20 Shillings	† a Pound Irish	0	18	$5\frac{1}{2}$
22½ Shillings	a Guinea	1	1	0

FLANDERS AND BRABANT.

Ghent, Oslend, &c. Antwerp, Brussels, &c.

† A Pening		0	0	$\frac{9}{16}$
4 Penings	= an Urche	0	0	$\frac{9}{8}$
8 Penings	† a Grote	0	0	$\frac{9}{4}$
2 Grotes	a Petard	0	0	$\frac{9}{2}$
6 Petards	† a Scalin	0	0	$5\frac{1}{2}$
7 Petards	a Scalin	0	0	$6\frac{3}{8}$
40 Grotes	† a Florin	0	1	6
17½ Scalins	a Ducat	0	9	3
240 Grotes	† a Pound Flem.	0	9	0

HOLLAND AND ZEALAND.

Amsterdam, Rotterdam, Middleburg, Flushing, &c.

† Pening		0	0	$\frac{2}{3}$
8 Penings	= † a Grote	0	0	$\frac{2}{3}$
2 Grotes	a Stiver	0	0	$1\frac{1}{3}$
6 Stivers	a Scalin	0	0	$6\frac{2}{3}$
20 Stivers	a Guilder	0	1	9
50 Stivers	a Rix-dollar	0	4	$4\frac{1}{2}$

HOLLAND, &c.

60 Stivers	a Dry Guilder	0	5	3
105 Stivers	a Ducat	0	9	3
6 Guilders	† a Pound Flem.	0	10	6

HAMBURG. *Altena, Lubec, Bremen, &c.*

† A Tryling	=	0	0	$\frac{1}{16}$
2 Trylings	† a Sexling	0	0	$\frac{1}{8}$
2 Sexlings	a Fening	0	0	$\frac{1}{4}$
12 Fenings	a Shilling Lub.	0	0	$1\frac{1}{8}$
16 Shillings	† a Marc	0	1	6
2 Marcs	a Slet dollar	0	3	0
3 Marcs	a Rix-dollar	0	4	6
6½ Marcs	a Ducat	0	9	$4\frac{1}{2}$
120 Shillings	† a Pound Flem.	0	11	3

HANOVER. *Lunenburgh, Zell, &c.*

† A Fening	=	0	0	$\frac{7}{8}$
3 Fenings	a Dreyer	0	0	$\frac{7}{16}$
8 Fenings	a Marien	0	0	$1\frac{1}{8}$
12 Fenings	a Grosh	0	0	$\frac{3}{4}$
8 Groshen	a Half Gulden	0	1	2
16 Groshen	a Gulden	0	2	4
24 Groshen	† a Rix-dollar	0	3	6
32 Groshen	a Double Gulden	0	4	8
4 Guldens	a Ducat	0	9	2

SAXONY AND HOLSTEIN.

Dresden, Leipzig, &c. Wismar, Keil, &c.

† An Heller	=	0	0	$\frac{7}{8}$
2 Hellers	a Fening	0	0	$\frac{7}{16}$
6 Hellers	a Dreyer	0	0	$\frac{7}{8}$
16 Hellers	a Marien	0	0	$1\frac{1}{8}$
12 Fenings	a Grosh	0	0	$1\frac{1}{4}$
16 Groshen	a Gould	0	2	4
24 Groshen	† a Rix-dollar	0	3	6
32 Groshen	a Specie-dollar	0	4	8
4 Goulds	a Ducat	0	9	4

BRANDENBURGH AND POMERANIA.

Berlin, Potsdam, &c. Stetin, &c.

† A Denier	=	0	0	$\frac{3}{4}$
9 Deniers	a Polchen	0	0	$\frac{3}{8}$
18 Deniers	a Grosh	0	0	$\frac{3}{4}$
3 Polchens	an Abras	0	0	$\frac{3}{8}$
20 Groshen	† a Marc	0	0	$9\frac{1}{2}$

30 Groshen

M O N
BRANDENBURGH, &c.

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M O N
POLAND, &c.

		£.	s.	d.
30 Groschen	a Florin	0	1	2
90 Groschen	† a Rix-dollar	0	3	6
108 Groschen	an Albertus	0	4	2
8 Florins	a Ducat	0	9	4

18 Groschen	= an Ort	0	0	8 ¹ / ₂
30 Groschen	a Florin	0	1	2
90 Groschen	† a Rix dollar	0	3	6
8 Florins	a Ducat	0	9	4
5 Rix-dollars	a Frederic d'Or	0	17	6

COLOGN, Mentz, Triers, Liege, Munich, Munster,
Paderbourn, &c.

A Dute	-	0	0	0 ⁷ / ₈
3 Dutes	= a Cruitzer	0	0	0 ¹ / ₈
2 Cruitzers	an Albus	0	0	0 ¹ / ₄
8 Dutes	a Stiver	0	0	0 ⁷ / ₈
3 Stivers	a Plapert	0	0	2 ¹ / ₈
4 Plaperts	a Copstuck	0	0	8 ¹ / ₂
40 Stivers	a Guilder	0	2	4
2 Guilders	a Hard Dollar	0	4	8
4 Guilders	a Ducat	0	9	4

LIVONIA.

Riga, Revel, Narva, &c.

A Blacken	-	0	0	0 ⁷ / ₈
6 Blackens	= a Grosh	0	0	0 ¹ / ₂
9 Blackens	a Vording	0	0	0 ¹ / ₅
2 Groschen	a Whiten	0	0	0 ¹ / ₄
6 Groschen	a Marc	0	0	2 ¹ / ₅
30 Groschen	a Florin	0	1	2
90 Groschen	† a Rix dollar	0	3	6
108 Groschen	an Albertus	0	4	2 ⁶ / ₁₅
64 Whitens	a Copper-plate Dollar	0	5	0

BOHEMIA, SILESIA, AND HUNGARY.

Prague, Breslaw, Presburg, &c.

A Fening	-	0	0	0 ⁷ / ₈
2 Fenings	= a Dreyer	0	0	0 ¹ / ₈
3 Fenings	a Grosh	0	0	0 ¹ / ₅
4 Fenings	a Cruitzer	0	0	0 ¹ / ₄
2 Cruitzers	a White Grosh	0	0	0 ¹ / ₅
60 Cruitzers	a Gould	0	2	4
90 Cruitzers	† a Rix-dollar	0	3	6
2 Goulds	a Hard Dollar	0	4	8
4 Goulds	a Ducat	0	9	4

DENMARK, ZEALAND, AND NORWAY.

Copenhagen, Sound, &c. Bergen, Drontheim, &c.

A Skilling	-	0	0	0 ² / ₃
6 Skillings	= a Duggen	0	0	3 ¹ / ₈
16 Skillings	† a Marc	0	0	9
20 Skillings	a Rix-marc	0	0	11 ¹ / ₄
24 Skillings	a Rix ort	0	1	1 ¹ / ₂
4 Marcs	a Crown	0	3	0
6 Marcs	a Rix dollar	0	4	6
11 Marcs	a Ducat	0	8	3
14 Marcs	a Hatt Ducat	0	10	6

AUSTRIA AND SWABIA.

Vienna, Tiefs, &c. Aufburg, Blenheim, &c.

A Fening	-	0	0	0 ⁷ / ₈
2 Fenings	= a Dreyer	0	0	0 ¹ / ₈
4 Fenings	a Cruitzer	0	0	0 ¹ / ₄
14 Fenings	a Grosh	0	0	1 ¹ / ₅
4 Cruitzers	a Batzen	0	0	1 ¹ / ₅
15 Batzen	a Gould	0	2	4
90 Cruitzers	† a Rix-dollar	0	3	6
30 Batzen	a Specie-dollar	0	4	8
60 Batzen	a Ducat	0	9	4

SWEDEN AND LAPLAND.

Stockholm, Upsal, &c. Thorn, &c.

† A Runstick	-	0	0	0 ¹ / ₂
2 Runsticks	= a Stiver	0	0	0 ¹ / ₅
8 Runsticks	a Copper Marc	0	0	1
3 Copper Marcs	a Silver Marc	0	0	4
4 Copper Marcs	a Copper Dollar	0	0	6
9 Copper Marcs	a Caroline	0	1	2
3 Copper Dollars	a Silver Dollar	0	1	6
3 Silver Dollars	a Rix-dollar	0	4	8
2 Rix dollars	a Ducat	0	9	4

FRANCONIA, Francfort, Nuremburg, Dettingen, &c.

A Fening	-	0	0	0 ⁷ / ₈
4 Fenings	= a Cruitzer	0	0	0 ¹ / ₄
3 Cruitzers	a Keyser Grosh	0	0	1 ² / ₅
4 Cruitzers	a Batzen	0	0	1 ¹ / ₅
15 Cruitzers	an Ort Gould	0	0	7
60 Cruitzers	a Gould	0	2	4
90 Cruitzers	† a Rix-dollar	0	3	6
2 Goulds	a Hard Dollar	0	4	8
240 Cruitzers	a Ducat	0	9	4

RUSSIA AND MUSCOVY.

Petersburg, Archangel, &c. Muscovy, &c.

A Polufca	-	0	0	0 ² / ₃
2 Polufcas	= a Denufca	0	0	0 ² / ₃
2 Denufcas	† a Copec	0	0	0 ² / ₃
3 Copecs	an Altin	0	0	1 ² / ₃
10 Copecs	a Grievener	0	0	5
25 Copecs	a Polpotin	0	1	1
50 Copecs	a Poltin	0	2	3
100 Copecs	a Ruble	0	4	6
2 Rubles	a Xervonitz	0	9	0

POLAND AND PRUSSIA.

Cracow, Warsaw, &c. Dantzic, Koningberg, &c.

A Shelon	-	0	0	0 ⁷ / ₈
3 Shelons	= a Grosh	0	0	0 ¹ / ₂
5 Groschen	a Coultic	0	0	2 ¹ / ₂
3 Coultics	a Tinfé	0	0	7

BASIL. Zurich, Zug, &c.

A Rap	-	0	0	0 ¹ / ₂
3 Rapen	= a Fening	0	0	0 ¹ / ₂
4 Fenings	a Cruitzer	0	0	0 ¹ / ₂
12 Fenings	† a Sol	0	0	1 ¹ / ₂

BASIL, &c.

		£.	s.	d.
15 Fenings	= a Coarse Batzen	0	0	1 $\frac{7}{8}$
18 Fenings	a Good Batzen	0	0	2 $\frac{1}{4}$
20 Sols	† a Livre	0	2	6
60 Cruitzers	a Gulden	0	2	6
108 Cruitzers	a Rix-dollar	0	4	6

St GALL. Apensal, &c.

An Heller	-	0	0	0 $\frac{1}{8}$
2 Hellers	= a Fening	0	0	0 $\frac{1}{8}$
4 Fenings	a Cruitzer	0	0	0 $\frac{1}{4}$
12 Fenings	† a Sol	0	0	0 $\frac{1}{2}$
4 Cruitzers	a Coarse Batzen	0	0	2
5 Cruitzers	a Good Batzen	0	0	2 $\frac{1}{2}$
20 Sols	† a Livre	0	2	6
60 Cruitzers	a Gould	0	2	6
102 Cruitzers	a Rix-dollar	0	4	3

BERN. Lucern, Neufchatel, &c.

A Denier	-	0	0	0 $\frac{1}{10}$
4 Deniers	= a Cruitzer	0	0	0 $\frac{1}{2}$
3 Cruitzers	† a Sol	0	0	1 $\frac{1}{2}$
4 Cruitzers	a Plapert	0	0	1 $\frac{1}{2}$
5 Cruitzers	a Gros	0	0	2
6 Cruitzers	a Batzen	0	0	2 $\frac{1}{2}$
20 Sols	† a Livre	0	2	0
75 Cruitzers	a Gulden	0	2	6
135 Cruitzers	a Crown	0	4	6

GENEVA. Pekay, Bonne, &c.

A Denier	-	0	0	0 $\frac{1}{2}$
2 Deniers	= a Denier current	0	0	0 $\frac{1}{2}$
12 Deniers	a Small Sol	0	0	0 $\frac{1}{3}$
12 Deniers current	a Sol current	0	0	0 $\frac{1}{3}$
12 Small Sols	† a Florin	0	0	4 $\frac{1}{2}$
20 Sols current	† a Livre current	0	1	3
10 $\frac{1}{2}$ Florins	a Patacon	0	3	11 $\frac{1}{2}$
15 $\frac{1}{2}$ Florins	a Croifade	0	5	10 $\frac{1}{2}$
24 Florins	a Ducat	0	9	0

Lisle, Cambray, Valenciennes, &c.

A Denier	-	0	0	0 $\frac{1}{4}$
12 Deniers	= a Sol	0	0	0 $\frac{1}{2}$
15 Deniers	† a Patard	0	0	0 $\frac{5}{8}$
15 Patards	† a Piette	0	0	9 $\frac{1}{4}$
20 Sols	a Livre Tournois	0	0	10
20 Patards	† a Florin	0	1	0 $\frac{1}{2}$
60 Sols	an Ecu of Ex.	0	2	6
10 $\frac{1}{2}$ Livres	a Ducat	0	9	3
24 Livres	a Louis d'Or	1	0	0

Dunkirk, St Omers, St Quintin, &c.

A Denier	-	0	0	0 $\frac{1}{4}$
12 Deniers	= a Sol	0	0	0 $\frac{1}{2}$
15 Deniers	† a Patard	0	0	0 $\frac{5}{8}$
15 Sols	† a Piette	0	0	9 $\frac{1}{4}$
20 Sols	† a Livre Tournois	0	0	10
3 Livres	an Ecu of Ex.	0	2	6
24 Livres	a Louis d'Or	1	0	0
25 $\frac{1}{2}$ Livres	a Guinea	1	1	0
32 $\frac{1}{2}$ Livres	a Moeda	1	7	0

VOL. XII. Part I.

Paris, Lyons, Marfeilles, &c. Bourdeaux, Bayonne, &c.

		£.	s.	d.
A Denier	-	0	0	0 $\frac{1}{4}$
3 Deniers	= a Liard	0	0	0 $\frac{1}{4}$
2 Liards	a Dardene	0	0	0 $\frac{1}{4}$
12 Deniers	a Sol	0	0	0 $\frac{1}{2}$
20 Sols	† a Livre Tournois	0	0	10
60 Sols	an Ecu of Ex.	0	2	6
6 Livres	an Ecu	0	5	0
10 Livres	† a Pistole	0	8	4
24 Livres	a Louis d'Or	1	0	0

PORTUGAL. Lisbon, Oporto, &c.

† A Re	-	0	0	0 $\frac{1}{10}$
10 Rez	= a Half Vintin	0	0	0 $\frac{1}{10}$
20 Rez	a Vintin	0	0	1 $\frac{1}{10}$
5 Vintins	a Testoon	0	0	6 $\frac{1}{2}$
4 Testoons	a Crusade of Ex.	0	2	3
24 Vintins	a New Crusade	0	2	8 $\frac{1}{2}$
10 Testoons	† a Milre	0	5	7 $\frac{1}{2}$
48 Testoons	a Moeda	1	7	0
64 Testoons	a Joanesa	1	16	0

Madrid, Cadix, Seville, &c. New Plate.

A Maravedie	-	0	0	0 $\frac{1}{12}$
2 Maravedies	= a Quartil	0	0	0 $\frac{1}{12}$
34 Maravedies	a Rial	0	0	5 $\frac{1}{12}$
2 Rials	a Pistarine	0	0	10 $\frac{1}{12}$
8 Rials	† a Piafre of Ex.	0	3	7
10 Rials	a Dollar	0	4	6
375 Maravedies	† a Ducat of Ex.	0	4	11 $\frac{1}{2}$
32 Rials	† a Pistole of Ex.	0	14	4
36 Rials	a Pistole	0	16	9

Gibraltar, Malaga, Denia, &c. Velon.

† A Maravedie	-	0	0	0 $\frac{1}{12}$
2 Maravedies	= a Ochavo	0	0	0 $\frac{1}{12}$
4 Maravedies	a Quartil	0	0	0 $\frac{1}{6}$
34 Maravedies	† a Rial Velon	0	0	2 $\frac{1}{6}$
15 Rials	† a Piafre of Ex.	0	3	7
512 Maravedies	a Piafre	0	3	7
60 Rials	† a Pistole of Ex.	0	14	4
2048 Maravedies	a Pistole of Ex.	0	16	9
78 Rials	a Pistole	0	16	9

Barcelona, Saragossa, Valencia, &c. Old Plate.

A Maravedie	-	0	0	0 $\frac{1}{12}$
16 Maravedies	= a Soldo	0	0	3 $\frac{1}{12}$
2 Soldos	a Rial Old Plate	0	0	6 $\frac{1}{12}$
20 Soldos	† a Libra	0	5	7
24 Soldos	† a Ducat	0	6	9
16 Soldos	† a Dollar	0	4	6
22 Soldos	† a Ducat	0	6	2 $\frac{1}{2}$
21 Soldos	† a Ducat	0	5	10 $\frac{1}{8}$
60 Soldos	a Pistole	0	16	9

GENOA. Novi, &c. CORSICA. Bastia, &c.

A Denari	-	0	0	0 $\frac{1}{10}$
12 Denari	= a Soldi	0	0	0 $\frac{1}{10}$
4 Soldi	a Chevalet	0	0	1 $\frac{1}{10}$
20 Soldi	† a Lire	0	0	8 $\frac{1}{10}$
30 Soldi	a Testoon	0	1	0 $\frac{1}{10}$

G g

5 Lires

GENOA, &c.

		£.	s.	d.
5 Lires	=	a Croifade	0	3 7
115 Soldi		†a Pezzo of Ex.	0	4 2
6 Testoons		a Genouine	0	6 2
20 Lires		a Pistole	0	14 4

PIEDMONT, SAVOY, AND SARDINIA.

Turin, Chamberry, Cagliari, &c.

		£.	s.	d.
A Denari	=	-	0	0 0 $\frac{1}{3}$
3 Denari		a Quatrini	0	0 0 $\frac{1}{3}$
12 Denari		a Soldi	0	0 0 $\frac{1}{4}$
12 Soldi		†a Florin	0	0 9
20 Soldi		†a Lire	0	1 3
6 Florins		a Scudi	0	4 6
7 Florins		a Ducatoon	0	5 3
13 Lires		a Pistole	0	16 3
16 Lires		a Louis d'Or	1	0 0

Milan, Modena, Parma, Pavia, &c.

		£.	s.	d.
A Denari	=	-	0	0 0 $\frac{3}{8}$
3 Denari		a Quatrini	0	0 0 $\frac{3}{8}$
12 Denari		a Soldi	0	0 0 $\frac{1}{4}$
20 Soldi		†a Lire	0	0 8 $\frac{1}{4}$
115 Soldi		a Scudi current	0	4 2 $\frac{1}{2}$
117 Soldi		†a Scudi of Ex.	0	4 3 $\frac{1}{2}$
6 Lires		a Philip	0	4 4 $\frac{1}{2}$
22 Lires		a Pistole	0	16 0
23 Lires		a Spanish Pistole	0	16 9

Leghorn, Florence, &c.

		£.	s.	d.
A Denari	=	-	0	0 0 $\frac{5}{144}$
4 Denari		a Quatrini	0	0 0 $\frac{5}{144}$
12 Denari		a Soldi	0	0 0 $\frac{5}{144}$
5 Quatrini		a Craca	0	0 0 $\frac{2}{18}$
8 Cracas		a Quilo	0	0 5 $\frac{5}{18}$
20 Soldi		†a Lire	0	0 8 $\frac{1}{3}$
6 Lires		a Piaſtre of Ex.	0	4 2 $\frac{1}{2}$
7½ Lires		a Ducat	0	5 2 $\frac{1}{2}$
22 Lires		a Pistole	0	15 6

ROME, Civita Vecchia, Ancona.

		£.	s.	d.
A Quatrini	=	-	0	0 0 $\frac{3}{10}$
5 Quatrini		a Bayoc	0	0 0 $\frac{1}{4}$
8 Bayocs		a Julio	0	0 6
10 Bayocs		a Stampt Julio	0	0 7 $\frac{1}{2}$
24 Bayocs		a Testoon	0	1 6
10 Julios		a Crown current	0	5 0
12 Julios		†a Crown stampt	0	6 0
18 Julios		a Chequin	0	9 0
31 Julios		a Pistole	0	15 6

NAPLES. Gaieta, Capua, &c.

		£.	s.	d.
A Quatrini	=	-	0	0 0 $\frac{2}{3}$
3 Quatrini		a Grain	0	0 0 $\frac{2}{3}$
10 Grains		a Carlin	0	0 4 $\frac{1}{3}$
40 Quatrini		a Paulo	0	0 5 $\frac{1}{3}$
20 Grains		a Tarin	0	0 8
40 Grains		a Testoon	0	1 4
100 Grains		a Ducat of Ex.	0	3 4
43 Tarins		a Pistole	0	15 4
25 Tarins		a Spanish Pistole	1	16 9

SICILY and MALTA. Palermo, Messina, &c.

		£.	s.	d.
A Pichila	=	-	0	0 0 $\frac{1}{15}$
6 Pichili		a Grain	0	0 0 $\frac{1}{15}$
8 Pichili		a Ponti	0	0 0 $\frac{1}{15}$
10 Grains		a Carlin	0	0 1 $\frac{1}{15}$
20 Grains		a Tarin	0	0 3 $\frac{1}{15}$
6 Tarins		†a Florin of Ex.	0	1 6 $\frac{1}{15}$
13 Tarins		a Ducat of Ex.	0	3 4
60 Carlins		†an Ounce	0	7 8 $\frac{4}{15}$
2 Ounces		a Pistole	0	15 4

Bologna, Ravenna, &c.

		£.	s.	d.
A Quatrini	=	-	0	0 0 $\frac{1}{16}$
6 Quatrini		a Bayoc	0	0 0 $\frac{1}{8}$
10 Bayocs		†a Julio	0	0 6
20 Bayocs		a Lire	0	1 0
3 Julios		a Testoon	0	1 6
80 Bayocs		a Schudi of Ex.	0	4 3
105 Bayocs		a Ducatoon	0	5 3
100 Bayocs		a Crown	0	5 0
31 Julios		a Pistole	0	15 6

VENICE. Bergham, &c.

		£.	s.	d.
A Picoli	=	-	0	0 0 $\frac{1}{18}$
12 Picoli		a Soldi	0	0 0 $\frac{1}{18}$
6½ Soldi		†a Gros	0	0 2 $\frac{1}{6}$
18 Soldi		a Jule	0	0 6
20 Soldi		†a Lire	0	0 6 $\frac{2}{3}$
3 Jules		a Testoon	0	1 6
124 Soldi		a Ducat current	0	3 5 $\frac{1}{4}$
24 Gros		†a Ducat of Ex.	0	4 4
17 Lires		a Chequin	0	9 2

TURKEY. Morea, Candia, Cyprus, &c.

		£.	s.	d.
A Mangar	=	-	0	0 0 $\frac{1}{16}$
4 Mangars		†an Asper	0	0 0 $\frac{1}{16}$
3 Aspers		a Parac	0	0 1 $\frac{1}{16}$
5 Aspers		a Bestic	0	0 3
10 Aspers		an Oſtic	0	0 6
20 Aspers		a Solota	0	1 0
80 Aspers		†a Piaſtre	0	4 0
100 Aspers		a Caragrouch	0	5 0
10 Solotas		a Xeriff	0	10 0

ARABIA. Medina, Mecca, Mocha, &c.

		£.	s.	d.
A Carret	=	-	0	0 0 $\frac{1}{10}$
5½ Carrets		a Caveer	0	0 0 $\frac{1}{10}$
7 Carrets		a Comashee	0	0 0 $\frac{1}{10}$
80 Carrets		a Larin	0	0 10 $\frac{1}{10}$
18 Comashees		an Abyſs	0	1 4 $\frac{1}{10}$
60 Comashees		†a Piaſtre	0	4 6
80 Caveers		a Dollar	0	4 6
100 Comashees		a Sequin	0	7 6
80 Larins		†a Tomond	3	7 6

PERSIA. Iſpahan, Ormus, Gombroon, &c.

		£.	s.	d.
A Coz	=	-	0	0 0 $\frac{3}{4}$
4 Coz		a Biſti	0	0 1 $\frac{1}{4}$
10 Coz		a Shahee	0	0 4
20 Coz		a Mamooda	0	0 8
25 Coz		a Larin	0	0 10
4 Shahees		an Abashee	0	1 4
		5 Abashees		

EUROPE, Southern Parts.

ITALY.

EUROPE, Southern Parts.

ITALY.

ASIA.

5 Abashees	=	an Or	-	-	£. s. d.
12 Abashees		a Bovell'o	-	-	0 8 6
50 Abashees		†a Tomond	-	-	0 16 0
					3 6 8

GUZZURAT. *Surat, Cambay, &c.*

A Pecka			0 0	0 $\frac{15}{16}$
2 Peckas	=	a Pice	-	0 $\frac{15}{16}$
4 Pices		a Fanam	-	0 0 1 $\frac{7}{8}$
5 Pices		a Viz	-	0 0 2 $\frac{1}{2}$
10 Pices		an Ana	-	0 0 7 $\frac{1}{2}$
4 Anas		a Rupee	-	0 2 6
2 Rupees		an English Crown	-	0 5 0
14 Anas		a Pagoda	-	0 8 9
4 Pagodas		a Gold Rupee	-	1 15 0

Bombay, Dabul, &c.

†A Budbrook	-	-	0 0	0 $\frac{27}{80}$
2 Budbrooks	=	†a Re	-	0 $\frac{27}{80}$
5 Rez		a Pice	-	0 $\frac{27}{80}$
16 Pices		a Laree	-	0 0 5 $\frac{2}{3}$
20 Pices		a Quarter	-	0 0 6 $\frac{1}{4}$
240 Rez		a Xeraphim	-	0 1 4 $\frac{1}{5}$
4 Quarters		a Rupee	-	0 2 3
14 Quarters		a Pagoda	-	0 8 0
60 Quarters		a Gold Rupee	-	1 15 0

Goa, Vijapour, &c.

†A Re	-	-	0 0	0 $\frac{27}{400}$
2 Rez	=	a Bazaraco	-	0 $\frac{27}{400}$
2 Bazaracos		a Pecka	-	0 $\frac{27}{100}$
20 Rez		a Vintin	-	0 0 1 $\frac{7}{10}$
4 Vintins		a Laree	-	0 0 5 $\frac{2}{3}$
3 Larees		a Xeraphim	-	0 1 4 $\frac{1}{5}$
42 Vintins		a Tangu	-	0 4 6
4 Tangus		a Paru	-	0 18 0
8 Tangus		a Gold Rupee	-	1 15 0

COROMANDEL. *Madras, Pondicherry, &c.*

A cash	-	-	0 0	0 $\frac{5}{12}$
5 Cash	=	a Viz	-	0 $\frac{5}{12}$
2 Viz		a Pice	-	0 $\frac{5}{12}$
6 Pices		a Pical	-	0 0 2 $\frac{3}{4}$
8 Pices		a Fanam	-	0 0 3
10 Fanams		a Rupee	-	0 2 6
2 Rupees		an English Crown	-	0 5 0
36 Fanams		a Pagoda	-	0 8 9
4 Pagodas		a Gold Rupee	-	1 15 0

BENGAL. *Calicut, Calcutta, &c.*

A Pice	-	-	0 0	0 $\frac{5}{12}$
4 Pices	=	a Fanam	-	0 $\frac{5}{12}$
6 Pices		a Viz	-	0 $\frac{5}{12}$
12 Pices		an Ana	-	0 0 1 $\frac{7}{8}$
10 Anas		a Fiano	-	0 1 6 $\frac{1}{4}$
16 Anas		a Rupee	-	0 2 6
2 Rupees		a French Ecu	-	0 5 0
2 Rupees		an English Crown	-	0 5 0
56 Anas		a Pagoda	-	0 8 9

ASIA.

AFRICA.

SIAM. *Pegu, Malacca, Cambodia, Sumatra, Java, Borneo, &c.*

A Cori	-	-	0 0	0 $\frac{1}{1000}$
800 Cori	=	a Fettee	-	0 0 0 $\frac{1}{1000}$
125 Fettees		a Sataleer	-	0 0 7 $\frac{1}{1000}$
250 Fettees		a Sooco	-	0 1 3
500 Fettees		a Tatal	-	0 2 6
900 Fettees		a Dollar	-	0 4 6
2 Ticals		a Rial	-	0 5 0
4 Soocos		an Ecu	-	0 5 0
8 Sateleers		a Crown	-	0 5 0

CHINA. *Pekin, Canton, &c.*

A Caxa	-	-	0 0	0 $\frac{3}{4}$
10 Caxa	=	a Candereen	-	0 0 0 $\frac{3}{4}$
10 Candereens		a Mace	-	0 0 8
35 Candereens		a Rupee	-	0 2 6
2 Rupees		a Dollar	-	0 4 6
70 Candereens		a Rix-dollar	-	0 4 4 $\frac{1}{2}$
7 Maces		an Ecu	-	0 5 0
2 Rupees		a Crown	-	0 5 0
10 Maces		†a Tale	-	0 6 8

JAPAN. *Jedda, Meaco, &c.*

A Piti	-	-	0 0	0 $\frac{1}{2}$
20 Pitis	=	a Mace	-	0 0 4
15 Maces		an Ounce Silver	-	0 4 10 $\frac{1}{2}$
20 Maces		a Tale	-	0 6 8
30 Maces		an Ingot	-	0 9 8 $\frac{1}{2}$
13 Ounces Silver		an Ounce Gold	-	13 3 0
2 Ounces Gold		a Japanese	-	6 6 0
2 Japaneses		a Double	-	12 12 0
21 Ounces Gold		†a Cattee	-	66 3 0

EGYPT. *Old and New Cairo, Alexandria, Sayde, &c.*

An Asper	-	-	0 0	0 $\frac{5}{12}$
3 Aspers	=	a Medin	-	0 0 1 $\frac{1}{2}$
24 Medins		an Italian Ducat	-	0 3 4
80 Aspers		†a Piaftre	-	0 4 0
30 Medins		a Dollar	-	0 4 6
96 Aspers		an Ecu	-	0 5 0
32 Medins		a Crown	-	0 5 0
200 Aspers		a Sultanin	-	0 10 0
70 Medins		a Pargo Dollar	-	0 10 0

BARBARY. *Algiers, Tunis, Tripoli, Una, &c.*

An Asper	-	-	0 0	0 $\frac{5}{12}$
3 Aspers	=	a Medin	-	0 0 1 $\frac{1}{2}$
10 Aspers		a Rial old Plate	-	0 0 6 $\frac{1}{2}$
2 Rials		a Double	-	0 1 1 $\frac{1}{2}$
4 Doubles		a Dollar	-	0 4 6
24 Medins		a Silver Chequin	-	0 3 4
30 Medins		a Dollar	-	0 4 6
180 Aspers		a Zequin	-	0 8 10
15 Doubles		a Pistole	-	0 16 9

MOROCCO. *Santa Cruz, Mequinez, Fez, Tangiers, Sallee, &c.*

A Fluce	-	-	0 0	0 $\frac{1}{12}$
24 Fluces	=	a Blanquil	-	0 0 2

AFRICA.

		£.	s.	d.
4 Blanquils	= an Ounce	0	0	8
7 Blanquils	an Octavo	0	1	2
14 Blanquils	a Quarto	0	2	4
2 Quartos	a Medio	0	4	8
28 Blanquils	a Dollar	0	4	6
54 Blanquils	a Xequin	0	9	0
100 Blanquils	a Pistole	0	16	9

		£.	s.	d.
† A Penny		0	0	1
12 Pence	= † a Shilling	0	1	0
20 Shillings	† a Pound	1	0	0
2 Pounds				
3 Pounds				
4 Pounds				
5 Pounds				
6 Pounds				
7 Pounds				
8 Pounds				
9 Pounds				
10 Pounds				

The value of the Currency alters according to the Plenty or Scarcity of Gold and Silver Coins that are imported.

AMERICA.

WEST-INDIES.

ENGLISH. Jamaica, Barbadoes, &c.

		£.	s.	d.
† Halfpenny		0	0	0 ¹ / ₂
2 Halfpence	= † a Penny	0	0	0 ¹ / ₂
7 ¹ / ₂ Pence	a Bit	0	0	5 ¹ / ₂
12 Pence	† a Shilling	0	0	8 ¹ / ₂
75 Pence	a Dollar	0	4	6
7 Shillings	a Crown	0	5	0
20 Shillings	† a pound	0	14	3
24 Shillings	a Pistole	0	16	9
30 Shillings	a Guinea	1	1	0

FRENCH. St. Domingo, Martinico, &c.

		£.	s.	d.
† A Half Sol		0	0	0 ¹ / ₂
2 Half Sols	= † a Sol	0	0	0 ¹ / ₂
7 ¹ / ₂ Sols	a Half Scalin	0	0	2 ¹ / ₂
15 Sols	a Scalin	0	0	5 ¹ / ₂
20 Sols	† a livre	0	0	7 ¹ / ₂
7 Livres	a Dollar	0	4	6
8 Livres	an Ecu	0	4	10 ¹ / ₂
26 Livres	a Pistole	0	16	9
32 Livres	a Louis d'Or	1	0	0

AMERICA.

CONTINENT.

Canada, Florida, Cayena, &c.

		£.	s.	d.
† A Denier				
12 Deniers	= † a Sol			
20 Sols	† a Livre			
2 Livres				
3 Livres				
4 Livres				
5 Livres				
6 Livres				
7 Livres				
8 Livres				
9 Livres				
10 Livres				

The value of the Currency alters according to the Plenty or Scarcity of Gold and Silver Coins that are imported.

Note. For all the Spanish, Portuguese, Dutch, and Danish Dominions, either on the Continent or in the West Indies, see the Moneys of the respective nations.

Ancient MONEY. See COINS and MEDALS.

Paper MONEY. See the article BANK.

Mongault

MONGAULT (Nicholas Hubert), an ingenious and learned Frenchman, and one of the best writers of his time, was born at Paris in 1674. At 16 he entered into the congregation of the fathers of the oratory, and was afterwards sent to Mans to learn philosophy. That of Aristotle then obtained in the schools, and was the only one which was permitted to be taught: nevertheless Mongault, with some of that original spirit which usually distinguishes men of uncommon abilities from the vulgar, ventured in a public thesis which he read at the end of the course of lectures, to oppose the opinions of Aristotle, and to maintain those of Des Cartes. Having studied theology with the same success, he quitted the oratory in 1699; and soon after went to Thoulouse, and lived with Colbert archbishop of that place, who had procured him a priory in 1698. In 1710 the duke of Orleans, regent of the kingdom, committed to him the education of his son the duke of Chartres; which important office he discharged so well, that he acquired an universal esteem. In 1714, he had the abbey of Chartreuse given him, and that of Ville-neuve in 1719. The duke of Chartres, becoming colonel-general of the French infantry, chose the Abbé Mongault to fill the place of secretary-general;

made him also secretary of the province of Dauphiny; and, after the death of the regent his father, raised him to other considerable employments. All this while he was as assiduous as his engagements would permit in cultivating polite literature; and, in 1714, published at Paris, in 6 vols. 12mo, an edition of Tully's Letters to Atticus, with an excellent French translation, and judicious comment upon them. This work has been often reprinted, and is justly reckoned admirable; for, as Middleton has observed, in the preface to his Life of Cicero, the Abbé Mongault "did not content himself with retailing the remarks of other commentators, or out of the rubbish of their volumes with selecting the best, but entered upon his task with the spirit of a true critic, and by the force of his own genius has happily illustrated many passages which all the interpreters before him had given up as inexplicable." He published also a very good translation of Herodian from the Greek; the best edition of which is that of 1745, in 12mo. He died at Paris in 1746. He was a member of the French academy, and of the academy of inscriptions and belles lettres; and was fitted to do honour to any society.

MONGOOZ, in zoology. See LEMUR.

MONK anciently denoted, "a person who retired from

Mongooz
Monk.

Monk. from the world to give himself up wholly to God, and to live in solitude and abstinence." The word is derived from the Latin *monachus*, and that from the Greek *μοναχος*, "solitary;" of *μονος* *solus*, "alone."

The original of monks seems to have been this: The persecutions which attended the first ages of the Gospel forced some Christians to retire from the world, and live in deserts and places most private and unfrequented, in hopes of finding that peace and comfort among beasts which were denied them among men. And this being the case of some very extraordinary persons, their example gave so much reputation to retirement, that the practice was continued when the reason of its commencement ceased. After the empire became Christian, instances of this kind were numerous; and those whose security had obliged them to live separately and apart, became afterwards united into societies. We may also add, that the mystic theology, which gained ground towards the close of the third century, contributed to produce the same effect, and to drive men into solitude for the purposes of enthusiastic devotion.

The monks, at least the ancient ones, were distinguished into *solitaires*, *cœnobites*, and *sarabaites*.

The *solitary* are those who live alone, in places remote from all towns and habitations of men, as do still some of the hermits.—The *cœnobites* are those who live in community with several others in the same house, and under the same superiors.—The *sarabaites* were strolling monks, having no fixed rule or residence.

The houses of monks again were of two kinds, viz. *monasteries* and *lauræ*. See MONASTERY and LAURA.

Those we call monks now-a-days are cœnobites, who live together in a convent or monastery, who make vows of living according to a certain rule established by the founder, and wear a habit which distinguishes their order.

Those that are endowed, or have a fixed revenue, are most properly called monks, *monachi*; as the Chartreux, Benedictines, Bernardines, &c. The Mendicants, or those that beg, as the Capuchins and Franciscans, are more properly called *religious* and *friars*; though the names are frequently confounded.

The first monks were those of St Antony; who, towards the close of the fourth century, formed them into a regular body, engaged them to live in society with each other, and prescribed to them fixed rules for the direction of their conduct. These regulations, which Antony had made in Egypt, were soon introduced into Palestine and Syria by his disciple Hilarion. Almost about the same time, Aones or Eugenius, with their companions Gaddanas and Azyzas, instituted the monastic order in Mesopotamia and the adjacent countries; and their example was followed with such rapid success, that in a short time the whole east was filled with a lazy set of mortals, who, abandoning all human connections, advantages, pleasures, and concerns, wore out a languishing and miserable life amidst the hardships of want, and various kinds of suffering, in order to arrive at a more close and rapturous communication with God and angels.

From the east this gloomy institution passed into the west, and first into Italy and its neighbouring islands; though it is uncertain who transplanted it thither.

Monk. St Martin, the celebrated bishop of Tours, erected the first monasteries in Gaul, and recommended this religious solitude with such power and efficacy, both by his instructions and his example, that his funeral is said to have been attended by no less than 2000 monks. From hence the monastic discipline extended gradually its progress through the other provinces and countries of Europe. There were besides the monks of St Basil (called in the east *Calogeri*, from *καλός* *γέρων* "good old man") and those of St Jerom, the hermits of St Augustine, and afterwards those of St Benedict and St Bernard; at length came those of St Francis and St Dominic, with a legion of others; all which see under their proper heads, BENEDICTINES, &c.

Towards the close of the 5th century, the monks, who had formerly lived only for themselves in solitary retreats, and had never thought of assuming any rank among the sacerdotal order, were now gradually distinguished from the populace, and endowed with such opulence and honourable privileges, that they found themselves in a condition to claim an eminent station among the supports and pillars of the Christian community. The fame of their piety and sanctity was so great, that bishops and presbyters were often chosen out of their order; and the passion of erecting edifices and convents, in which the monks and holy virgins might serve God in the most commodious manner, was at this time carried beyond all bounds. However, their licentiousness, even in this century, was become a proverb; and they are said to have excited the most dreadful tumults and seditions in various places. The monastic orders were at first under the immediate jurisdiction of the bishops, from which they were exempted by the Roman pontiff about the end of the 7th century; and the monks, in return, devoted themselves wholly to advance the interests and to maintain the dignity of the bishop of Rome. This immunity which they obtained was a fruitful source of licentiousness and disorder, and occasioned the greatest part of the vices with which they were afterwards so justly charged. In the 8th century the monastic discipline was extremely relaxed both in the eastern and western provinces, and all efforts to restore it were ineffectual. Nevertheless, this kind of institution was in the highest esteem, and nothing could equal the veneration that was paid about the close of the 9th century to such as devoted themselves to the sacred gloom and indolence of a convent. This veneration induced several kings and emperors to call them to their courts, and to employ them in civil affairs of the greatest moment. Their reformation was attempted by Louis the Meek, but the effect was of short duration. In the 11th century they were exempted by the popes from the authority of their sovereigns, and new orders of monks were continually established; insomuch that in the council of Lateran that was held in the year 1215, a decree was passed, by the advice of Innocent III. to prevent any new monastic institutions; and several were entirely suppressed. In the 15th and 16th centuries, it appears, from the testimonies of the best writers, that the monks were generally lazy, illiterate, profligate, and licentious Epicureans, whose views in life were confined to opulence, idleness, and pleasure. However, the Reformation had a manifest influence

Monk. influence in restraining their excesses, and rendering them more circumspect and cautious in their external conduct.

Monks are distinguished by the colour of their habits into *black, white, grey, &c.* Among the monks, some are called *monks of the choir*, others *professed monks*, and others *lay monks*; which last are destined for the service of the convent, and have neither clericate nor literature.

Cloistered Monks, are those who actually reside in the house; in opposition to *extra-monks*, who have benefices depending on the monastery.

Monks are also distinguished into *reformed*, whom the civil and ecclesiastical authority have made masters of ancient convents, and put in their power to retrieve the ancient discipline, which had been relaxed; and *ancient*, who remain in the convent, to live in it according to its establishment at the time when they made their vows, without obliging themselves to any new reform.

Anciently the monks were all laymen, and were only distinguished from the rest of the people by a particular habit and an extraordinary devotion. Not only the monks were prohibited the priesthood, but even priests were expressly prohibited from becoming monks, as appears from the letters of St Gregory. Pope Syricius was the first who called them to the clericate, on occasion of some great scarcity of priests, that the church was then supposed to labour under: and since that time, the priesthood has been usually united to the monastical profession.

MONK (George), a personage memorable for having been the principal agent in restoring Charles II. to his crown, was descended from a very ancient family, and born in Devonshire in 1608. Being an unprovided younger son, he dedicated himself to arms from his youth, and obtained a pair of colours in the expedition to the Isle of Rhée: he served afterwards in the Low Countries with reputation in both King Charles's northern expeditions; and did such service in quelling the Irish rebellion, that he was appointed governor of Dublin, but was superseded by parliamentary authority. Being made major-general of the Irish brigade employed in the siege of Nantwich in Cheshire, he was taken prisoner by Sir Thomas Fairfax, and remained confined in the Tower of London until the year 1646; when, as the means of liberty, he took the covenant, and accepted a command in the Irish service under the parliament. He obtained the command in chief of all the parliamentary forces in the north of Ireland, where he did signal services, until he was called to account for a treaty made with the Irish rebels; a circumstance which was only obliterated by his future good fortune. He served in Scotland under Oliver Cromwell with such success, that he was left there as commander in chief; and he was one of the commissioners for uniting that kingdom with the new-erected commonwealth. He served at sea also against the Dutch; and was treated so kindly on his return, that Oliver is said to have grown jealous of him. He was, however, again sent to Scotland as commander in chief, and continued there five years: when he dissembled so well, and improved circumstances so dextrously, that he aided the desires of a wearied people, and restored the king without any

disturbance; for which he was immediately rewarded both with honours and profit: (See *BRITAIN*, n^o 194, &c.)—He was created duke of Albemarle, with a grant of 7000*l.* *per annum* estate, beside other emoluments; and enjoyed the confidence of his master without forfeiting that of the people. After his death in 1670, there was published a treatise composed by him while he remained prisoner in the Tower, intitled, "Observations on Military and Political Affairs," a small folio.

MONK-Fish. See *SQUALUS*.

MONKS-Head, or Wolf's bane. See *ACONITUM*.

MONKEY, in zoology. See *APE* and *SIMIA*.

MONMOUTH (James, duke of), son to Charles II. by Mrs Lucy Walters, was born at Rotterdam in 1649. Upon the Restoration, he was called over to England, where the king received him with all imaginable joy, created him earl of Orkney (which was changed into that of Monmouth), and he took his seat in the house of peers in the ensuing session of parliament. He married Anne, the heiress of Francis earl of Buccleugh; and hence it came to pass that he had also the title of *Buccleugh*, and took the surname of *Scot*, according to the custom of Scotland. In 1668 his father made him captain of his life-guard of horse; and in 1672 he attended the French king in the Netherlands, and gave proofs of bravery and conduct. In 1673 the king of France made him lieutenant-general of his army, with which he came before Maastricht, and behaved himself with incredible gallantry, being the first who entered it himself. He returned to England, was received with all possible respect, and was received chancellor of the university of Cambridge. After this he went to assist the prince of Orange to raise the siege of Mons, and did not a little contribute towards it. He returned to England; and was sent, in quality of his father's general, to quell an insurrection in Scotland, which he effected: but soon after he fell into disgrace; for, being a Protestant, he was deluded into ambitious schemes, upon the hopes of the exclusion of the duke of York: he conspired against his father and the duke: and when the latter came to the throne by the title of *James II.* he openly appeared in arms, encouraged by the Protestant army; but coming to a decisive battle before he had sufficient forces to oppose the royal army, he was defeated, taken soon after concealed in a ditch, tried for high treason, condemned, and beheaded in 1685, aged 36. See *BRITAIN*, n^o 242. 249—265.

MONMOUTH, the capital of the county of Monmouthshire in England, 129 miles from London.—It has its name from its situation at the conflux of the Monow or Mynwy, and the Wye, over each of which it has a bridge, and a third over the Frothy.—Here was a castle in William the Conqueror's time, which Henry III. took from John Baron of Monmouth. It afterwards came to the house of Lancaster, who bestowed many privileges upon the town. Here Henry V. surnamed *of Monmouth*, was born. The famous historian Geoffrey was also born at this place. Formerly it gave the title of *earl* to the family of Carey, and of *duke* to king Charles the Second's eldest natural son; but now of *earl* to the Mordaunts, who are also earls of Peterborough. It is a populous and well built place, and carries on a

Monmouth considerable trade with Bristol by means of the Wye. Monnoye. It has a weekly market, and three fairs.

MONMOUTHSHIRE, a county of England; anciently reckoned a part of Wales, but in Charles the Second's time taken into the Oxford circuit, and made an English county. It is bounded on the north by Herefordshire, on the east by Gloucestershire, on the south by the river Severn, and on the west by the Welch counties of Brecknock and Glamorgan. Its extent from north to south is about 30 miles, from east to west 26, and in circumference 110. It is subdivided into six hundreds; and contains seven market-towns, 127 parishes, about 6494 houses, 38,900 inhabitants; but sends only three members to parliament, that is, one for Monmouth, and two for the county. The air is temperate and healthy; and the soil fruitful, though mountainous and woody. The hills feed sheep, goats, and horned cattle; and the valleys produce plenty of grass and corn. This county is extremely well watered by several fine rivers; for, besides the Wye, which parts it from Gloucestershire, the Mynow, which runs between it and Herefordshire, and the Rumney, which divides it from Glamorganshire, it has, peculiar to itself, the Usk, which enters this county a little above Abergavenny, runs mostly southward, and falls into the Severn by the mouth of the Ebwith; which last river runs from north to south, in the western side of the county. All these rivers, especially the Wye and Usk, abound with fish, particularly salmon and trout.

MONNOYE (Bernard de la), born at Dijon in 1641, was a man of fine parts and great learning. He was admirably formed for poetry; and used to win the first prizes instituted by the members of the French academy, till he discontinued to write for them (it is said) at the solicitation of the academy; a circumstance which, if true, would reflect higher honour on him than a thousand prizes. All his pieces are in a most exquisite taste; and he was no less skilful in Latin poetry than in the French. Menage and Bayle have both bestowed the highest encomiums on his Latin poetry. His Greek poems are likewise looked upon as very good; and so are his Italian, which are written with great spirit. But poetry was not La Monnoye's only province: to a perfect skill in poetry, he joined a very accurate and extensive knowledge of the languages. He had great skill in criticism; and no man applied himself with greater assiduity to the study of history, ancient and modern. He was perfectly acquainted with all the scarce books that had any thing curious in them; very well versed in the history of the learned; and what completes all, is the wonderful clearness with which he possessed these various kinds of knowledge. He wrote *Remarks on the Menagiana*; in the last edition of which, in 4 vols 12mo, printed in 1715, are included several pieces of his poetry, and a curious dissertation on the famous book *De tribus Impostoribus*. His Dissertation on *Pamponius Latus*, at least an extract of it, is inserted in the new edition of Baillet's *Jugemens des sçavans*, published in 1722, with a great number of remarks and corrections by La Monnoye. He also embellished the *Anti-Baillet* of Menage with a multitude of corrections and notes. It would employ several pages to enumerate the various services this in-

genious and learned man did to the republic of letters; as well by enriching it with productions of his own, as by the assistance which he communicated very freely upon all occasions to the learned of his times. Thus, among others, he favoured Bayle with a great number of curious particulars for his Dictionary, and was highly applauded by him on that account. He died at Paris, October 15th 1728, in his 88th year. —Mr de Sallinger published at the Hague A Collection of Poems by La Monnoye, with his elogium, from whence many of the above particulars are taken. He also left behind him a Collection of Letters, mostly critical; several curious Dissertations; 300 Select Epigrams from Martial, and other poets ancient and modern, in French verse; several other works in prose and verse, in French, Latin, and Greek, all ready for the press.

MONNOYER (John Baptist), "one of the greatest masters (according to Mr Walpole) that has appeared for painting flowers. They are not so exquisitely finished as Van Huysum's, but his colouring and composition are in a bolder style." He was born at Lille in 1635; and educated at Antwerp as a painter of history, which he soon changed for flowers. Going to Paris in 1663, he was received into the academy with applause; and employed at Versailles, Trianon, Marly, and Meudon; and painted in the hotel de Bretonvilliers at Paris, and other houses. The duke of Montague brought him to England; where much of his hand is to be seen, at Montague-house, Hampton-court, the duke of St Alban's at Windsor, Kensington, Lord Carlisle's, Burlington-house, &c. But his most curious work is said to be a looking-glass at Kensington palace, which he adorned with flowers for Queen Mary, who held him in such high esteem, that she honoured him with her presence nearly the whole time he was busied in the performance. —Baptist passed and repassed several times between France and England; but having married his daughter to a French painter who was suffered to alter and touch upon his pictures, Baptist was offended and returned to France no more. He died in Pall-mall in 1699. —His son Antony, called *young Baptist*, painted in his father's manner, and had merit.

MONOCEROS, unicorn, in astronomy, a southern constellation formed by Hevelius, containing in his catalogue 19 stars, and in the Britannic Catalogue 31.

MONOCEROS, in zoology. See MONODON.

MONOCHORD; an instrument by which we are enabled to try the several proportions of musical sounds and intervals, as well in the natural as in tempered scales. Originally it had, as its name implies, only one string; but it is better constructed with two, as we have by means of this additional string an opportunity of judging of the harmony of two tempered notes in every possible variety of temperament (see TEMPERAMENT and TUNING). It consists of a brass rule placed upon a sound-board, and accurately divided into different scales according to the purposes for which it is chiefly intended. Above this rule the strings are to be stretched over two fixed bridges, between which there is a moveable fret, so contrived as to divide at pleasure one of the strings into the same proportional parts as are engraved upon the scales beneath. The figure of the instrument, the manner of striking

Monnoyer
||
Mono-
chord.

Mono-
chord.

striking the strings so as to produce the sound, as likewise the construction of the moveable bridge, may be varied at pleasure according to the wish and ingenuity of the artist: But with the assistance of such an instrument accurately constructed, any person with a good ear may be enabled to tune a keyed instrument with sufficient precision to answer every practical purpose.

The following table contains the chief scales that have hitherto been computed. In column 1st is given the natural scale, or scale of perfect intervals. The second column contains a new tempered scale, which seems better adapted than any other to keyed instruments, when chiefly designed for lesson-playing, or playing without accompaniments. The third is a scale proposed by Mr Emerson in his *Mechanics*, and since recommended by Mr Jones in his *Physiological Disquisitions*, and by Mr Cavallo in the *Philosophical Transactions* for 1788. The fourth and fifth exhibit the systems of mean tones, and of equal harmony, calculated by Dr Smith for instruments of a more perfect construction than those now in use.

Note.	Natural Scale.	Tempered Scale.	Emerson, Jones, &c.	Mean Tones.	Equal Harmony
C		1000			
C*	937.5	952.9	943.8	957	959.3
D $\flat$				934.5	933
D	888.9	893.3	890.9	894.4	895
D*	833.3	837.5	840.8	856	858.6
E $\flat$				836	835
E	800	798	793.7*	800	801
F $\flat$				781	779
E*				765.6	768.5
F	750	748.1	749.1	747.6	747.4
F*	711.1	712.9	707.1	715.5	717
G $\flat$				698.7	697.3
G	666.7	668.3	667.4	668.7	669
G*	625	632	629.9	640	641.7
A $\flat$				625	624
A	600	597	594.0	598	598.7
A*	562.5	559.7	561.2	572.4	574.4
B $\flat$				559	558.6
B	533.3	533.3	529.7*	535	536
C $\flat$				522.4	521
B*				512	514
C	500	500	500	500	500

N. B. Mr Jones proposes to have the two numbers which are denoted by stars respectively altered to the numbers 796 and 531.

The method of tuning any instrument by means of the monochord is as follows: First, you must tune the C of the monochord to the concert pitch by means of a tuning-fork; next, you are to put the middle C of your instrument in perfect unison with the C of the monochord: Then move the sliding fret to the next division on the scale, and proceed in the same manner with all the several notes and half notes within the compass of an octave. When this is done with accuracy, the other keys are all to be tuned, by com-

N° 226.

paring them with the octave which is already tempered. [The monochord is here supposed to be made to the pitch of C; but this may be varied at the will of the constructor.]

The curious reader who may wish for further information respecting the construction and use of monochords, will be highly gratified in perusing the appendix of Mr Atwood's *Treatise on Rectilinear Motion*, and Mr Jones's ingenious and entertaining observations on the scale of music, monochord, &c. in his *Physiological Disquisitions*.

MONOCHORD is also used for any musical instrument that consists of only one string or chord; in this sense the trumpet marine may properly be called a monochord.

MONOCULUS, in zoology; the name of a genus of insects of the order of *aptera*, in the Linnæan system. Its body is short, of a roundish figure, and covered with a firm crustaceous skin; the fore-legs are ramose, and serve for leaping and swimming; it has but one eye, which is large, and composed of three smaller ones.

Of this genus, many of which have been reckoned among the microscopic animals, authors enumerate a great number of species. The figure in Plate CCCXV. represents the quadricornis, or four-horned monocus, a very small species about half a line in length, and of an ashen grey colour. From the head arise four antennæ, two forwards and two backwards; all four furnished with a few hairs, which give them the figure of a branch. Between the antennæ, on the fore part of the head, is situated a single eye. From the head to the tail the body goes down, decreasing in shape like a pear; and is composed of seven or eight rings, which grow continually more straitened. The tail is long, divided into two; each division giving rise outwardly to three or four bristly hairs. The animal carries its eggs on the two sides of its tail in the form of two yellowish parcels filled with small grains, and which taken together, nearly equal the insect in bigness. This minute insect is found in standing pools. A number of them being kept in a bottle of water, some will be seen loaded with their eggs, and after a while depositing the two parcels, either jointly or separately.

The name *monoculus* has been given to this genus, as consisting of individuals which apparently have but one eye: and from the manner in which they proceed forward in the water by leaping, they have also been called *water-fleas*. The branching antennæ serve them instead of oars, the legs being seldom used for swimming. "The tail, forked in some species, in others simple, serves them for a rudder. Their colour varies from white to green, and to red, more or

less deep, doubtless in a ratio to the fragments of the vegetables on which they feed. The red tincture they sometimes give to the water, has made some ignorant men think that the water had turned to blood. Too weak to be carnivorous, they on the contrary fall a prey to other aquatic insects, even to polypii. Their body, compact and hard, is so transparent that in some the eggs with which the abdomen is filled are discernible. The water-parrot and the shell-monoculus, are remarkable. This latter is provided with a bivalvular shell, within which he shuts himself

Mono-
chord.Barbut's Gen-
era of In-
sects,
p. 360.

Monodon. himself up, if drawn out of the water. The shell opens underneath, the insect puts forth its antennæ, by means of which it swims very expeditiously in various directions, seeking a solid body to adhere to, and then it is it uses its feet in walking, by stretching them out through the aperture of its shell.

"I preserved a pair of these insects (says our author), last year, in a small glass tumbler, the one male the other female, having a bag filled with eggs affixed on each side the abdomen. In the space of 14 days the increase was astonishing: it would have been impossible to have taken a single drop of water out of the glass without taking with it either the larva or a young monocus. I again repeated the experiment by selecting another pair; and at the expiration of the last 14 days my surprise was increased beyond measure. The contents of the glass appeared a mass of quick-moving, animated matter; and being diversified by colours of red, green, ash-colour, white, &c. afforded, with the assistance of the magnifier, considerable entertainment."

Plate
CCCXV.

MONODON, in ichthyology, a genus of fishes belonging to the order of *cete*; the characters of which are: There are too very long, straight, and spirally twisted teeth, which stick out from the upper jaw; and the spiracle, or breathing hole, is situated on the anterior part of the skull. There is but one species, the monoceros, or horned narwhal, which sometimes grows to 25 feet in length, exclusive of the horn; but the usual size is from 16 to 20. It is particularly noted for its horn or horns, as they are called; but which are real teeth. Of these there are always two in young animals; though the old ones have generally but one, sometimes none. From the circumstance of only one tooth being usually found, the animal has acquired the name of *Unicorn Fish*, or *Sea Unicorn*. They inhabit the northern seas, from Norway to within the arctic circle: they are plentiful in Davis's straits and the north of Greenland; where the natives, for want of wood, make rafters of the teeth. From the tooth or horn may be distilled a very strong *sal volatile*: the scrapings are esteemed *alexipharmic*, and were used of old in malignant fevers and against the bites of serpents. The use of it to the animal seems to be chiefly as a weapon of offence, and a very powerful one it appears to be: there are many instances of its having been found in the bottoms of ships which returned from the northern seas, probably owing to the animal's having mistaken the ship for a whale, and attacked it with such fury as not to be able to get out the weapon from the wood. It may also serve as an instrument to loosen and disengage from the rocks or bottom of the sea the sea plants on which it feeds. These fishes swim swiftly, and can only be struck when numbers happen to be found together, and obstruct their own course with their teeth. Their skin is white, with black spots on the back, and has a great quantity of blubber underneath.

The tooth of this animal was in old times imposed upon the world as the horn of an unicorn, and sold at a very high price. The heirs of the chancellor to Christian Friisus of Denmark, valued one at 8000 imperials. There is a magnificent throne made of this species of ivory for the Danish monarchs, which

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is still preserved in the castle at Rosenberg. The price of this material was superior to gold.

MONODY, in ancient poetry, a mournful kind of song, sung by a person all alone, to give vent to his grief. The word is derived from *μονος* "alone," and *κίρη* "I sing."

MONOECIA, from *μονος* alone, and *οικια* a house; the name of the 21st class in Linnæus's sexual method. See **BOTANY**.

MONOGAMY, compounded of *μονος* *solus*, and *γαμος* "marriage," the state or condition of those who have only married once, or are restrained to a single wife. See **POLYGAMY**.

MONOGLOSSUM (anc. geog.), a mart-town of the Hither India, situated on the Sinus Canthi, into which the Indus empties itself. Said to be Mangajor on the coast of Malabar. E. Long. 74°, N. Lat. 13°.

MONOGRAM, a character or cypher, composed of one, two, or more letters interwoven; being a kind of abbreviation of a name, anciently used as a seal, badge, arms, &c.

MONOGYNIA, from *μονος* alone, and *γυνη* a woman; the name of the first order or subdivision in the first 13 classes of Linnæus's sexual method; consisting of plants which, besides their agreement in their classic character, generally derived from the number of their stamina, have only one style, or female organ.

MONOMOTAPA, a country of Africa, has the maritime kingdom of Sofala on the east, the river Del Spiritu Santo on the south, the mountains of Caffraria on the west, and the river Cauma on the north, which parts it from Monoemugi. The air of this country is very temperate; the land fertile in pastures and all the necessaries of life, being watered by several rivers. The inhabitants are rich in black cattle, which they value more than gold. They have a vast number of elephants, as appears from the great quantity of ivory that is exported from hence. There are many gold-mines, and the rivers that run through their veins carry a great deal of gold-dust along with them. The inhabitants are lovers of war, which is the employment followed by all those who do not apply themselves to commerce. This country is divided into seven provinces or petty kingdoms, vassals to the king; viz. Monomotapa Proper, Quiteve, Manica, Inhambana, Inhemior, Sabia, and Sofala.

MONOPETALOUS, in botany, a term applied to flowers that have only one petal or flower-leaf.

MONOPHYSITES, (from *μονος* *solus*, and *φύσις* *natura*), a general name given to all those sectaries in the Levant who only own one nature in Jesus Christ; and who maintain, that the divine and human nature of Christ were so united as to form only one nature, yet without any change, confusion, or mixture of the two natures.

The *monophysites*, however, properly so called, are the followers of Severus, a learned monk of Palestine, who was created patriarch of Antioch in 513, and Petrus Fullensis.

The *monophysites* were encouraged by the emperor Anastasius, but depressed by Justin and succeeding emperors. However, this sect was restored by Jacob Baradæus an obscure monk, inasmuch that

H h

when

Monody
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Monophysites.

Monophy- when he died bishop of Edeffa, A. D. 588, he left it in a most flourishing state in Syria, Mesopotamia, Armenia, Egypt, Nubia, Abyssinia, and other countries. The laborious efforts of Jacob were seconded in Egypt and the adjacent countries, by Theodosius bishop of Alexandria; and he became so famous that all the monophysites of the east considered him as their second parent and founder, and are to this day called *jacobites*, in honour of their new chief. The monophysites are divided into two sects or parties, the one African, the other Asiatic; at the head of the latter is the patriarch of Antioch, who resides for the most part in the monastery of St Ananias, near the city of Merdin: the former are under the jurisdiction of the patriarch of Alexandria, who generally resides at Grand Cairo, and are subdivided into Coptes and Abyssinians. From the 15th century downwards, all the patriarchs of the monophysites have taken the name of *Ignatius*, in order to show that they are the lineal successors of Ignatius, who was bishop of Antioch in the first century, and consequently the lawful patriarchs of Antioch. In the 17th century, a small body of the monophysites in Asia abandoned for some time the doctrine and institution of their ancestors, and embraced the communion of Rome: but the African monophysites, notwithstanding that poverty and ignorance which exposed them to the seductions of sophistry and gain, stood firm in their principles, and made an obstinate resistance to the promises, presents, and attempts employed by the papal missionaries to bring them under the Roman yoke: and in the 18th century, those of Asia and Africa have persisted in their refusal to enter into the communion of the Romish church, notwithstanding the earnest intreaties and alluring offers that have been made from time to time by the pope's legates, to conquer their inflexible constancy. The monophysites propagate their doctrine in Asia with zeal and assiduity, and have not long ago gained over to their communion a part of the Nestorians, who inhabit the maritime coasts of India.

MONOPOLY, one or more persons making themselves the sole masters of the whole of a commodity, manufacture, and the like, in order to make private advantage of it, by selling it again at a very advanced price. Or it is a licence or privilege allowed by the king for the sole buying and selling, making, working, or using any thing whatsoever.—Monopolies had been carried to an enormous height during the reign of Queen Elisabeth; and were heavily complained of by Sir Edward Coke, in the beginning of the reign of King James I.: but were in great measure remedied by statute 21 Jac. I. c. 3. which declares such monopolies to be contrary to law, and void; (except as to patents, not exceeding the grant of 14 years, to the authors of new inventions; and except also patents concerning printing, saltpetre, gunpowder, great ordnance, and shot); and monopolists are punished with the forfeiture of treble damages and double costs, to those whom they attempt to disturb; and if they procure any action, brought against them for these damages, to be stayed by any extrajudicial order, other than of the court wherein it is brought, they incur the penalties of *præmunire*. Combinations also among victuallers or artificers, to raise the price

of provisions, or any commodities, or the rate of labour, are in many cases severely punished by particular statute; and, in general, by statute 2 & 3 Edward VI. c. 15. with the forfeiture of L. 10 or 20 days imprisonment, with an allowance of only bread and water for the first offence; L. 20 or the pillory for the second; and L. 40 for the third, or else the pillory, loss of one year, and perpetual infamy. In the same manner, by a constitution of the emperor Zeno, all monopolies and combinations to keep up the price of merchandise, provisions, or workmanship, were prohibited, upon pain of forfeiture of goods and perpetual banishment.

MONOSYLLABLE, in grammar, a word that consists only of one syllable, and is composed either of one or more letters pronounced at the same time. The too frequent use of monosyllables has a very bad effect in English poetry, as Mr Pope both intimates and exemplifies in the same verse, viz.

“And ten slow words oft creep in one dull line.”

MONOTHELITES, (compounded of *μῆκος* single, and *θέλημα* “will,” of *θέλω* volo “I will”), an ancient sect, which sprung out of the Eutychians; thus called, as only allowing of one will in Jesus Christ.

The opinion of the Monothelites had its rise in 630, and had the emperor Heraclius for an adherent: it was the same with that of the Acephalous Severians. They allowed of two wills in Christ, considered with regard to the two natures; but reduced them to one, by reason of the union of the two natures; thinking it absurd there should be two free wills in one and the same person. They were condemned by the sixth general council in 680, as being supposed to destroy the perfection of the humanity of Jesus Christ, depriving it of will and operation. Their sentiments were afterwards embraced by the Maronites.

MONOTONY, an uniformity of sound, or a fault in pronunciation, when a long series of words are delivered in one unvaried tone. See **READING**.

MONOTROPA, BIRD'S-NEST: A genus of the monogynia order, belonging to the monandria class of plants; and in the natural method ranking with those of which the order is doubtful. There is no calyx, but 10 petals; and of these the five exterior have a melliferous hollow at the base. The capsule is quinquevalved. In some of the flowers a fifth part of the number is excluded as in the *M. hippopithys*. There are two species; of which the only remarkable one is the hippopithys, a native of Britain and some of the more northerly kingdoms of Europe. It is about five inches high, having no other leaves than oval scales, and terminated with a nodding spike of flowers, which in the seeding state becomes erect: the whole plant is of a pale yellow colour, smelling like the primrose, or like beans in blossom. The country people in Sweden give the dried plant to cattle that have a cough.

MONREAL. See **MONTREAL**.

MONRO (Dr Alexander, senior), a most eminent physician and anatomist, was descended by his father from the family of Monro of Milton, which had large possessions in the county of Ross; and by his mother, from that of Forbes of Culloden.

His father John, youngest son of Sir Alexander Monro of Bearcrofts, was bred to physic and surgery, and

Monosyllable
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Monro.

Monro. and served for some years as a surgeon in the army under King William in Flanders: but, for several successive years, obtaining leave of absence from the army in the winter, he during that season resided with his wife in London, where his son Alexander was born in the 1697. About three years thereafter, he quitted the army, and went to settle as a surgeon at Edinburgh; where his knowledge in his profession, and engaging manners, soon introduced him into an extensive practice.

The son showed an early inclination to the study of physic; and the father, after giving him the best education that Edinburgh then afforded, sent him successively to London, Paris, and Leyden, to improve himself further in his profession. At London, he attended the lectures of Messrs Hawksbee and Whiston on experimental philosophy, and the anatomical demonstrations of Mr Cheselden. At Paris, he attended the hospitals, and the lectures which were read on the different branches of physic and surgery at that time. Towards the end of autumn 1718, he went to Leyden, and studied under the great Boerhaave; by whom he was particularly esteemed.

On his return to Edinburgh in autumn 1719, Messrs Drummond and Macgill, who were then conjunct nominal professors and demonstrators of anatomy to the surgeons company, having resigned in his favour, his father prevailed on him to read some public lectures on anatomy, and to illustrate them by showing the curious anatomical preparations which he had made and sent home when abroad. He at the same time persuaded Dr Alston, then a young man, to give some public lectures on botany. Accordingly, in the beginning of the winter 1720, these two young professors began to give regular courses of lectures, the one on the materia medica and botany, the other on anatomy and surgery; which were the first regular courses of lectures on any of the branches of medicine that had ever been read at Edinburgh, and may be looked upon as the opening of that medical school which has since acquired such great reputation all over Europe.

In summer 1721 and 1722, Dr Monro, by the persuasion of his father, read some lectures on chirurgical subjects; particularly on wounds and tumors, which he never would publish, having wrote them in a hurry and before he had much experience; but inserted from time to time the improvements he thought might be made in surgery, in the volumes of Medical Essays and Observations to be hereafter mentioned.

About the year 1720, his father communicated to the physicians and surgeons at Edinburgh, a plan, which he had long formed in his own mind, of having the different branches of physic and surgery regularly taught at Edinburgh; which was highly approved of by them, and by their interest regular professorships of anatomy and medicine were instituted in the university. His son, Dr Monro, was first made university-professor of anatomy; and two or three years afterwards, Drs Sinclair, Rutherford, Innes, and Plummer, were made professors of medicine; the professorship of materia medica and botany, which Dr Alston then held, having been added to the university many years before. Immediately after these gentlemen were elected professors, they began to deliver re-

gular courses of lectures on the different branches of medicine, and they and their successors have uniformly continued so to do every winter.

The plan for a medical education at Edinburgh was still incomplete without an hospital, where students could see the practice of physic and surgery, as well as hear the lectures of the professors. A scheme was therefore proposed by Dr Monro's father, and others, particularly the members of the royal college of physicians and board of surgeons, for raising by subscription a fund for building and supporting an hospital for the reception of diseased poor; and our author published a pamphlet setting forth the advantages that would attend such an institution. In a short time a considerable sum of money was raised, a small house was fitted up, and patients were admitted into it, and regularly attended by many of the physicians and surgeons in town. The fund for this charity increasing very considerably, in a great measure from the activity and influence of that very worthy citizen and magistrate George Drummond, Esq; the foundation was laid of the present large, commodious, and useful hospital, the *Royal Infirmary*; in the planning of which Dr Monro suggested many useful hints, and in particular the elegant room for chirurgical operations was designed and executed under his direction. Provost Drummond and he were nominated the building committee; and the fabric was entirely completed in a short space of time. It has since been so largely endowed, as to be capable of receiving a great number of diseased poor, whose cases the students of physic and surgery have an opportunity of seeing daily treated with the greatest attention and care by physicians and surgeons eminent in their profession; and a register of the particulars of all the cases which have been received into the house since its first opening has been kept, in books appropriated for that purpose, for the use of the students.

In order to make the hospital of still further use to the students, Dr Monro frequently, while he continued professor of anatomy, gave lectures on the chirurgical cases; and the late judicious physician, Dr Rutherford professor of the practice of physic, began, in the year 1748, to deliver clinical lectures, to be continued every winter, on the most remarkable cases in the hospital.

Doctor Monro, though he was elected professor of anatomy in the year 1721, was not received into the university till the year 1725, when he was inducted along with that great mathematician the late Mr Colin Maclaurin, with whom he ever lived in the strictest friendship. From this time he regularly every winter gave a course of lectures on anatomy and surgery, from October to May, upon a most judicious and comprehensive plan: A task in which he persevered with the greatest assiduity, and without the least interruption, for near 40 years; and so great was the reputation he had acquired, that students flocked to him from the most distant corners of his majesty's dominions.

In 1759, our professor entirely relinquished the business of the anatomical theatre to his son Dr Alexander, who had returned from abroad, and had assisted him in the course of lectures the preceding year. But after this resignation, he still endeavoured to render his

Monro.

labours useful to mankind, by reading clinical lectures at the hospital for the improvement of the students; of which Dr Duncan, who was one of his pupils, has given the following account. "There I had myself the happiness of being a pupil, who profited by the judicious conduct of his practice, and was improved by the wisdom and acuteness of his remarks. I have indeed to regret that I attended only the last course of lectures in which he had ever a share, and at a time when he was subjected to a disease which proved at length fatal. Still, however, from what I saw and from what I heard, I can venture to assert, that it is hardly possibly to conceive a physician more attentive to practice, or a preceptor more anxious to communicate instructions. His humanity, in the former of these characters, led him to bestow the most anxious care on his patients while they were alive; and his zeal in the latter induced him to make them the subject of useful lessons when they happened to die.—In the different stations of physician, of lecturer, and of manager in the hospital, he took every measure for inquiring into the causes of diseases by dissection.—He personally attended the opening of every body; and he not only dictated to the students an accurate report of the dissection, but with nice discrimination contrasted the diseased and sound state of every organ. Thus, in his own person, he afforded to the students a conspicuous example of the advantages of early anatomical pursuits, as the happiest foundation for a medical superstructure. His being at once engaged in two departments, the anatomical theatre and clinical chair, furnished him with opportunities both on the dead and living body, and placed him in the most favourable situation for the improvement of medicine; and from these opportunities he derived every possible advantage which they could afford."

His father, old Mr Monro, lived to an advanced age; and enjoyed the unspeakable pleasure of beholding a son, esteemed and regarded by mankind, the principal actor in the execution of his favourite plan, the great object of his life, the founding a seminary of medical education in his native country: The son, who survived him near 30 years, had the satisfaction to behold this seminary of medical education frequented yearly by 300 or 400 students, many of whom came from the most distant corners of his majesty's dominions, and to see it arrive to a degree of reputation far beyond his most sanguine hopes, being equalled by few, and inferior to none, in Europe.

Few men were members of more societies than Dr Monro; still fewer equally assiduous in their attendance of those which in any way tended to promote public utility. He was a manager of many public charities; and not only a member of different medical societies, but likewise of several others instituted for promoting literature, arts, sciences, and manufactures, in Scotland, and was one of their most useful members.—While he was held in high estimation at home, he was equally esteemed and respected abroad, and was elected member of the Royal Society of London, and an honorary member of the Royal Academy of Surgery at Paris.

He was not only very active in the line of his own profession, but as a citizen and general member of the

community; for, after he had resigned the anatomical chair to his son, he executed with the strictest punctuality the duties of several engagements both of a civil and political nature: He was a director of the Bank of Scotland, a Justice of the Peace, a Commissioner of High Roads, &c. At length, after a life spent in the most active industry, he became afflicted with a tedious and painful disease, which he bore with equal courage and resignation till his death, which happened on July 10th 1767, in the 70th year of his age.

Of his works, the first in order is his Osteology, which was written for the use of students, but is capable also of affording instruction to the oldest and most experienced practitioner; as, besides a minute description of the parts copied from nature, it every where abounds with new and important observations immediately applicable to practice. It has been translated into many different languages; has passed through numerous editions; and has been reprinted in foreign countries in the most superb manner, accompanied with elegant and masterly engravings. His description of the Lacteal Sac and Thoracic Duct contains the most accurate account of that important part of the body which has been yet published; and his Anatomy of the Nerves will transmit to posterity an excellent example of accurate dissection, faithful description, and ingenious reasoning. The six volumes of Medical Essays and Observations, published by a society in Edinburgh, are universally known and esteemed. To that society he was appointed secretary; but, after the publication of the first volume, to which he had largely contributed, the members growing remiss in their attendance, he became the sole collector and publisher of the work: To him we are therefore in a great measure indebted for those numerous and important discoveries with which this publication has enriched every department of medical knowledge. In the two first volumes of the Physical and Literary Essays, published by the physical society of Edinburgh, in which he had the rank of one of the presidents, we find several papers written by him, which are not the least ornaments of that collection. His account of the Success of Inoculation in Scotland may be considered as his last publication: It demonstrates his extensive correspondence and indefatigable industry, and has had great influence in promoting that salutary practice. Besides these, he was also the author of several other elegant and masterly productions, which were either never published, or were published without his knowledge and from incorrect copies. A collection of all his works, properly arranged, corrected, and illustrated with copperplates, has been published by Dr Alexander Monro, his son and successor in the anatomical chair, in a splendid quarto volume, printed for Elliot, Edinburgh, 1781; to which is prefixed a life of the author, by another of his sons, Dr Donald, physician in London. The observation of an excellent judge, the illustrious Haller, concerning our author's Medical Essays and Observations, which now form a part of this collection, may with no less justice be applied to the whole: It is a "book which ought to be in the possession of every medical practitioner."

MONS, an ancient, large, handsome, rich, and very strong city of the Austrian Netherlands, in Hainault.

Monro.

Monseigneur
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Monfon.

nault. There is a chapter, consisting of 30 ladies of distinction, who have the liberty of leaving the community when they intend to marry. They have several manufactures, and a good trade. It was taken by the allies in 1709, and by the French in July 1716; but rendered back by the treaty of Aix-la-Chapelle, after the fortifications were demolished. It stands partly on a hill, and partly on a plain in a marshy soil, on the rivers Haine and Trouilli, by which the country about it may be overflowed at pleasure. It has been lately taken by the armies of the French Republic. E. Long. 3. 39. N. Lat. 50. 25.

MONS *Sacer*, (anc. geog.), a mountain of the Sabines beyond the Anio, to the east of Rome; whither the common people retired once and again to avoid the tyranny of the patricians. From this secession, and the altar of *Jupiter Terribilis* erected there, the mountain took its name.

MONSEIGNEUR, in the plural *Messeigneurs*, a title of honour and respect used by the French in writing to persons of superior rank or quality, before the late abolition of all ranks.

Dukes, peers, archbishops, bishops, and presidents *à la mortier*, were complimented with the title of *Monseigneur*. In the petitions presented to the sovereign courts, they used the term *Messeigneurs*.

MONSEIGNEUR, absolutely used, was a title restrained to the dauphin of France. This custom was unknown till the time of Louis XIV. before which the dauphin was styled *Monsieur le Dauphin*.

MONSIEUR, in the plural *Messieurs*, a term or title of civility, used by the French in speaking to their equals, or those a little below them, answering to *Mr* or *Sir* among the English.

MONSIEUR, absolutely used, was a title or quality appropriated to the second son of France, or the king's brother. The king was also called *Monsieur*, but that only by the children of France.

MONSON (Sir William), a brave English admiral, third son of Sir John Monson of South Carlton in Lincolnshire, was born in 1569. He was employed in many expeditions against the Spaniards in Queen Elizabeth's time, and was highly honoured; the queen knighted him for his services in the earl of Essex's expedition to Cadiz, where he assisted much by his wife and moderate counsel to the earl. Military men were no favourites with James I. therefore, on the death of the queen, he received no recompence or pay beyond the ordinary service in which he was engaged: nevertheless, as admiral of the narrow seas, he supported the honour of the British flag against the infant insolence of the Dutch states, of which he frequently complains in his Navy Tracts; and protected our trade against the encroachments of France. He had the misfortune to fall into disgrace by his vigilance, and was imprisoned in the Tower through the resentment of some powerful courtiers; yet he was discharged, and wrote a vindication of his own conduct, intitled, "Concerning the insolencies of the Dutch, and a Justification of Sir William Monson." He spent his latter days in peace and privacy, which he employed in digesting his Navy Tracts, and died in 1643.—Part of these tracts were printed in 1682; and they were afterwards all included in Churchill's Collection of Voyages.

MONSONIA, in botany: A genus of the dodecandria order, belonging to the polyadelphia class of plants. The calyx is pentaphyllous; the corolla pentapetalous and irregular; the stamina are 15 in number, and coalited into five filaments; the style bifid; the capsule pentacoccous.

MONSOON, a regular or periodical wind, in the East Indies, blowing constantly the same way, during six months of the year, and the contrary way the remaining six.

In the Indian ocean, the winds are partly general, and blow all the year round the same way, as in the Ethiopic ocean; and partly periodical, *i. e.* half the year blow one way, and the other half near on the opposite points: and those points and times of shifting differ in different parts of this ocean. These latter are what we call *monsoons*.

The shifting of these monsoons is not all at once; and in some places the time of the change is attended with calms, in others with variable winds, and particularly those of China, at ceasing to be westerly, are very subject to be tempestuous; and such is their violence, that they seem to be of the nature of the West India hurricanes, and render the navigation of those seas very unsafe at that time of the year. These tempests the seamen call the *breaking up of the monsoons*.

Monsoons, then, are a species of what we otherwise call *trade-winds*. They take the denomination *monsoon* from an ancient pilot, who first crossed the Indian sea by means hereof. Though others derive the name from a Portuguese word, signifying motion or change of wind, and sea.

Lucretius and Apollonius make mention of annual winds which arise every year, *etesia flabria*, which seem to be the same with what in the East Indies we now call *monsoons*. For the physical cause of these winds, see WIND.

MONSTER; a birth or production of a living being, degenerating from the proper and usual disposition of parts in the species to which it belongs: As, when there are too many members, or too few; or some of them are extravagantly out of proportion, either on the side of defect or excess. The word comes from the Latin *monstrum*, of *monstrando*, "showing." Whence also the box wherein relics were anciently kept to be shown, was called *monstrum*. Dugdale mentions an inventory of the church of York with this article, *Item unum monstrum cum ossibus sancti Petri in Beryl, & crucifixo in summitate*.

Aristotle defines a monster to be a defect of nature, when, acting towards some end, it cannot attend to it, from some of its principles being corrupted.

Monsters do not propagate their kind; for which reason some rank *mules* among the number of monsters, as also *hermaphrodites*.

Females which bring forth twins, are found most liable to produce monsters. The reason, probably, is owing to this; that though the twins are covered with one common chorion, yet they have each their separate amnios, which by their contiguity may chance to grow together, and so occasion a confusion or blending of the parts. Hence so many double creatures.

F. Malebranche accounts for the production of monsters in the animal world in the following manner.

Monsonia
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Monster.

Monster. ner: "The Creator has established such a communication between the several parts of his creation, that we are not only naturally led to imitate one another, *i. e.* have a disposition to do the same things and assume the same manners with those with whom we converse; but also have certain natural dispositions which incline us to compassion as well as imitation. These things most men feel, and are sensible of; and therefore need not be proved. The animal spirits, then, are not only naturally carried into the respective parts of the body to perform the same actions and the same motions which we see others do, but also to receive in some manner their wounds, and take part in their sufferings.

"Experience tells us, that when we look attentively on any person severely beaten, or that hath a large wound, ulcer, or the like, the spirits immediately flow into those parts of our body which answer to those we see suffer in the other; unless their course be stopped from some other principle. This flux of spirits is very sensible in persons of a delicate constitution, who frequently shudder, and find a kind of trembling in the body on these occasions; and this sympathy in bodies produces compassion in the mind.

"Now it must be observed, that the view of a wound, &c. wounds the person who views it the more strongly and sensibly, as the person is more weak and delicate; the spirits making a stronger impression on the fibres of a delicate body than in those of a robust one. Thus strong, vigorous men, &c. see an execution without much concern, while women, &c. are struck with pity and horror. As to children still in their mother's womb, the fibres of their flesh being incomparably finer than those in women, the course of the animal spirits must necessarily produce much greater alterations.

"These things being laid down, monsters are easily accounted for. Suppose, *v. gr.* a child born a fool, and with all its legs and arms broke in the same manner as those of criminals in some countries are; which case we choose to instance in, because we are told from Paris that such a monster was actually born there, and lived in one of their hospitals 20 years: the cause of this accident, according to the principles laid down, was, that the mother seeing a criminal executed, every stroke given to the poor man, struck forcibly the imagination of the woman; and, by a kind of counter-stroke, the tender and delicate brain of the child.—Now, though the fibres of the woman's brain were strangely shaken by the violent flux of animal-spirits on this occasion, yet they had strength and consistence enough to prevent an entire disorder; whereas the fibres of the child's brain being unable to bear the shock of those spirits, were quite ruined, and the ravage was great enough to deprive him of reason all his lifetime.

"Again, the view of the execution frightening the woman, the violent course of the animal spirits was directed forcibly from the brain to all those parts of the body corresponding to the suffering parts of the criminal; and the same thing must happen in the child. But in regard the bones of the mother were strong enough to resist the impulse of those spirits, they were not damaged: and yet the rapid course of these spirits could easily overpower and break the tender and

delicate fibres of the bones of the child; the bones being the last parts of the body that are formed, and having a very slender consistence while the child is yet in the womb."

To which it may be here added, that had the mother determined the course of these spirits towards some other part of her body, by tickling or scratching herself vehemently, the child would not in all probability have had its bones broken; but the part answering that to which the motion of the spirits was determined, would have been the sufferer. Hence appears the reason why women in the time of gestation, seeing persons, &c. marked in such a manner in the face, impress the same mark on the same parts of the child: and why, upon rubbing some hidden part of the body when startled at the sight of any thing or agitated with any extraordinary passion, the mark or impression is fixed on that hidden part rather than on the face of the child. From the principles here laid down, may most, if not all, the phenomena of monsters be easily accounted for.

Various other theories have been formed by different philosophers and physiologists. But after all, it must be confessed, that we seem as yet to be very little acquainted with Nature in her sports and errors. For each organised being there appears to exist a primitive germ or model of the different species drawn by the Creator, determined by forms and sexes, and realised in the individuals of both sexes, which must unite in order to their reproduction. From this model nature never departs, unless when compelled by circumstances which derange the primitive organization common to the species, and produce what we call *monsters*.

With respect to structure, we have already remarked, that monsters are of various kinds. Some have an excess or defect in certain parts; such as those which are called *acephalous*, or who want the head; those which have two heads, two arms, two legs, and one body, or which have two bodies and one head, or which have three legs; and those which want the arms or the legs. Others err through an extraordinary and deformed conformation, through an unnatural union of certain parts or viscera, through a great derangement in one or more of their members, and through the extraordinary place which these often occupy in consequence of this derangement or transposition. The monster described by Dr Eller of the academy of Berlin was of this kind. It was a foetus of nine months, 28 inches long, with an enormous head and frightful countenance; and in the middle of a broad and vast forehead it had a reddish eye, without either eyebrows or eyelids, and sunk deep into a square hole. Immediately below this eye was an excrescence which strongly resembled a penis with a glans, a prepuce, and an urethra: the part covered with hair was likewise below the nape of the neck. In other monsters we meet with the unnatural union of some parts, which, from their destination and functions, ought always to be separate; and the separation of other parts, which, for the same reasons, ought constantly to be united. The reader may see the different ways in which the formation of monsters takes place in four memoirs by M. Lemery, inserted in *L'Histoire de l'Academie des Sciences* 1738 and 1739. M. du Verney has likewise published a Memoir on the same subject.

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In the volume published by the Academy of Sciences in 1724, mention is made by M. Geoffroy of a monster born in Barrois 1722. This monstrous production consisted of two children without the inferior extremities, joined together by a common navel: each of them had a nurse, sucked, and eat pap; and the one sucked while the other slept. The reader may likewise consult the second part of Winslow's Memoirs on Monsters, inserted in the volume published by the Academy of Sciences in 1734, where he will find the history of two very extraordinary twin monsters, who evidenced during their life a great difference in their moral and physical qualities. We are obliged simply to refer to those Memoirs, as they are too long for abridgement.

It is observed by Haller, that in some monsters the natural structure is changed by some shock or passion: in others the structure, independent of any accident, is originally monstrous; such as when all the members are reversed from left to right, when the person has six fingers, and in many other instances. M. de Mau-pertuis mentions, that there is at Berlin a family who have had six fingers on each hand for several generations. M. de Riville saw an instance of this at Malta, of which he has given a description. M. Renou, surgeon at Pommeraye in Anjou, has published an account of some families with six fingers, which are to be found in several parishes of the Lower Anjou, and which have existed there from time immemorial. This deformity is perpetuated in these families even when they intermarry with persons who are free from it. Whether the propagation of these supernumerary organs, which are not only useless but inconvenient and even disagreeable, be owing to the father or mother, their children of both sexes are subject to it indiscriminately. A father or mother with six fingers frequently have a part, and sometimes the whole, of their children, free from this deformity; but it again makes its appearance, and in a very great degree, in the third generation. From this it appears, that this fault in the conformation is hereditary. M. Reaumur has likewise published the history of a family in the island of Malta, the children of which are born with six fingers and six toes. But it deserves to be inquired, Whether these supernumerary fingers are real fingers? The reader may here consult the *Journal de Physique* for November 1774, p. 372. This variety of *sexdigitary* hands and feet is not comprehended in the *Recherches sur quelques conformations monstrueuses des doigts dans l'homme*, which is inserted in the Memoirs of the Academy of Sciences for 1771. In the *Journal de Physique* for August 1776, we find a description of a double uterus and vagina observed in a woman who died in childbed, by Dr Purcell of Dublin: and in that for June 1788, we have an account of a man with seven fingers on each hand, by Baron Dietrich.

Several monstrous productions are to be seen in the cabinet at Chantilly. 1. Two calves joined together in the body, with each a separate head and neck, and four legs in whole. 2. Two calves united only by the pelvis, with only one anus and one tail: the whole is supported by six legs, four before and two behind. 3. A lamb with six legs, four of which are behind. 4. The skeleton of a ram, which has likewise six legs. 5. A hermaphrodite deer. 6. The head of a foal,

which has only one eye in the middle of the forehead. 7. Some leverets with six and eight legs. 8. A puppy, the lips of which are divided fourfold. 9. Some foetuses of a hog which have a kind of tube upon their forehead one or two inches long; and another, the hinder part of which is double in every thing. 10. Two double human foetuses joined by the belly, with four arms and three legs. 11. A young chicken with two bodies and one head. 12. A pigeon and a duck, each with two bills. 13. A duck with two heads. 14. A pigeon with four feet. 15. A capon with three feet; the third being fixed to the anus. 16. Two heads of a calf joined together, each of them with two ears: these two heads were both fixed to one neck. 17. In the *Menagerie* at Chantilly there was formerly to be seen a cow with five feet, the fifth of which was connected with the dug. 18. A rabbit without ears. 19. Two cats, each having two heads. 20. Two leverets newly brought forth, well shaped in the body and legs, but connected together by means of only one head. 21. Several eggs, in the figure of which there occur some monstrous appearances and extraordinary deformities, sufficient to show that they are contrary to the established form of nature.

Everhard Hume, Esq; F. R. S. some time ago presented to John Hunter, Esq; F. R. S. the *double skull* of a child, born at Calcutta in May 1783 of poor parents aged 30 and 35, and which lived to be nearly two years old. The body of this child was naturally formed: but the head had the phenomenon of appearing double; another head of the same size, and almost equally perfect, being attached to its upper part. In this extraneous and preternatural head no pulsation could be felt in the arteries of the temples, but the superficial veins were very evident; one of the eyes had been hurt by the fire, upon which the midwife, in her first alarm, threw the child: the other moved readily; but the iris was not affected by the approach of any thing to it. The external ears of this head were very imperfect; the tongue adhered to the lower jaw, except for about half an inch at the lip, which was loose; the jaw was capable of motion, but there were no teeth. The child was shown about the streets of Calcutta for a curiosity; but was rendered unhealthy by confinement, and died at last of a bite of the *cobra de capello*. It was dug up by the East India Company's agent for salt at Tumlock, and the skull is now in the museum of Mr Hunter.

Among the monstrous productions of the animal kingdom, we may rank those individuals which ought only to possess one sex, but in which we observe the union or the appearance of two. See the articles ANDROGYNES and HERMAPHRODITE.

M. Fabri arranges mutilations of the members, distortions, gibbosities, tumors, divisions of the lips or of the palate, compressions of the cranium, and many other deformities of this kind, in the class of *morbific monstruosities*. In that which he calls *connatural* (*connaturelle*) monstruosities, are placed the plurality, transposition, and insertion of the parts. To explain these facts, a great many writers have had recourse to the effect of the imagination of pregnant women.—The causes of the first class of monstruosities are discussed by M. Fabri, who observes, that some of them are *internal* with regard to the mother, and others *external*.

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ternal. By an *internal cause*, he here means all those depravations or morbid principles which can affect the fluids, and which vitiate the form and structure of the solids; in particular the uterus, in which such depravations have often been found to occur. To these he adds violent affections of the mind, spasmodic contractions, hysteric convulsions, and the many inconveniences of this kind to which women are extremely subject. External causes comprehend every thing which can act externally upon the foetus contained in the uterus, such as the pressure of the clothes; and in short every thing which prevents the free dilatation of the belly in women who are pregnant, violent motions, falls, blows, and all accidents of this kind. These external causes, and especially the first, compress the foetus in the womb, and oblige it to remain in a very confined situation. This, according to the observation of Hippocrates, produces those embryos which are born with some entire part wounded. M. Fabri maintains, that all deformities of the foetus proceed from mechanical and accidental causes.

The name of *monsters* is likewise given to animals enormous for bulk; such as the elephant among terrestrial quadrupeds, and the shark and the whale among sea animals; to other animals remarkable for fierceness and cruelty; and to animals of an extraordinary species, which, we are told, arises from the copulation of one animal with another of a different genus. According to the report of travellers, Africa abounds with monsters of this kind; and accounts of the East are full of descriptions of sea monsters, which, however, are seldom to be seen, such as *sea men*, *mermaids*, &c.

Monsters are more common and more extraordinary in the vegetable than in the animal kingdom, because the different juices are more easily deranged and confounded together. Leaves are often seen, from the internal part of which other leaves spring forth; and it is not uncommon to see flowers of the ranunculus, from the middle of which issues a stalk bearing another flower. M. Bonnet informs us, that in certain warm and rainy years he has frequently met with monsters of this kind in rose-trees. This observer saw a rose, from the centre of which issued a square stalk of a whitish colour, tender, and without prickles, which at its top bore two flower-buds opposite to each other, and totally destitute of a calyx; a little above the buds issued a petal of a very irregular shape. Upon the prickly stalk which supported the rose, a leaf was observed which had the shape of trefoil, together with a broad flat pedicle. In the Memoirs of the Academy of Sciences for 1707, p. 448, mention is made of a rose, from the centre of the leaves of which issued a rose-branch two or three inches long, and furnished with leaves. See the same Memoirs for 1749, p. 44, and for 1724, p. 20. In the Memoirs for 1775, a very singular instance is mentioned of a monstrosity observed by M. Duhamel, in an apple-tree ingrafted with clay. At the place of the insertion, there appeared a bud which produced a stalk and some leaves; the stalk and the pedicle of the leaves were of a pulpy substance, and had the most perfect resemblance both in taste and smell to the pulp of a green apple. An extraordinary *chamamelum* is mentioned in the *Acta*
N° 227.

Helvetica. M. Bonnet, in his *Recherches sur l'usage des feuilles*, mentions likewise some monstrous productions which have been found in fruits with kernels, analogous in their nature to those which occur in the flowers of the ranunculus and of the rose-tree. He has seen a pear, from the eye of which issued a tuft of 13 or 14 leaves, very well shaped, and many of them of the natural size. He has seen another pear which gave rise to a ligneous and knotty stalk, on which grew another pear somewhat larger than the first.—The stalk had probably flourished, and the fruit had formed. The *lilium album polyanthos*, observed some years ago at Breslaw, which bore on its top a bundle of flowers, consisting of 102 lilies, all of the common shape, is well known. M. Reynier has mentioned some individuals monstrous with respect to the flower, in the *Journal de Physique et d'Histoire Naturelle*, for November 1785. He has likewise mentioned a monstrous tulip which is seen in the gardens of some amateurs; juniper berries with horns; a balsamine with three spurs, &c.

These vegetable productions, which are so extraordinary, and so contrary to the common course of things, do nevertheless present deviations subject to particular laws, and reducible to certain principles, by distinguishing such as are perpetuated either by seed or by transplanting, from those which are only accidental and passing. Monstrosities which are perpetuated exist in the original organization of the seed of the plant, such as marked or curled leaves, &c. The word *monster* is more properly applied to those irregularities in plants which arise from frequent transplantation, and from a particular culture, such as double flowers, &c.: but those monstrosities which are not perpetuated, and which arise from accidental and transient causes deranging the primitive organization of the plant, when it comes to be unfolded, as is the effect of diseases, of heat or cold, of a superfluity or scarcity of juices, of a depravation of the vessels contributing to nutrition, of the sting of insects, of contusions and natural grafts, retain also the name of *monsters*. Of this kind are knobs or swellings, stunting, gall-nuts, certain streaks, and other similar defects. All the parts of plants are subject to some of these monstrosities, which vary with respect to their situation, figure, proportion, and number. Some trees are naturally of so great a size, that they may be considered as a kind of whale species in the vegetable kingdom: of this kind are the baobab and the ceiba. Others, as the oak, the yew, the willow, the lime, and many others, sometimes, though rarely, attain so extraordinary a bulk that they are likewise monsters among the vegetables. It is conjectured, in short, that monsters are more common in the vegetable than in the animal kingdom, because in the latter the methods of propagation are not so numerous. Plants are seldom monstrous in all their parts: some are monstrous only through excess in the calyx and corolla; others are so through defect only in the leaves, stamina, and fruit. Now, a monstrosity, says M. Adanson, has never changed the name or affected the immutability of a species. Every skilful succeeding botanist has arranged these monstrosities in plants among accidental circumstances, which, in whatever manner they are

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are propagated, have always a tendency to revert to the order and regularity of their original species when they are multiplied by means of seed; which method of reproduction is the most natural and the most certain for determining the species. One species may be compared with another; but a monster can only be put in comparison with an individual of the species from which it comes. The reader may consult the *Observations Botaniques* of M. Schlotterbec, of the Society of Basil, concerning monsters in plants, wherein he pretends to demonstrate, that in their production nature follows the same course in the vegetable as in the animal kingdom.

MONT-ALBAN, a strong town of Spain, in the kingdom of Arragon, with a strong citadel; seated on the river Riomartin, 44 miles south of Saragossa, and 92 north by west of Valencia. W. Long. 0. 30. N. Lat. 41. 9.

MONT-Didier, an ancient town of France in Picardy, where the kings of France formerly had a palace and kept their court. It is seated on a mountain, 17 miles from Amiens and Compeigne, and 58 north of Paris. W. Long. 2. 34. N. Lat. 49. 39.

MONT-Lheri, a town of the isle of France, 15 miles from Paris. Here are the remains of a tower, which may be seen at a great distance. E. Long. 2. 0. N. Lat. 48. 38.

MONT-Louis, a small but strong town of France, in the Pyrenees, with a strong citadel; seated on an eminence, 430 miles south of Paris. E. Long. 2. 5. N. Lat. 42. 30.

MONT-Luel, a town of France in Bresse, and capital of the territory of Valbonne; seated in a fertile pleasant country on the river Seraine, eight miles from Lyons, and 205 south-east of Paris. E. Long. 5. 8. N. Lat. 45. 49.

MONT-Luzon, a town of France in Bourbonnois; seated on the river Cher, 35 miles south-west of Moulins, and 150 south of Paris. E. Long. 2. 45. N. Lat. 46. 22.

MONT-Blanc. See *Mont-BLANC*.

MONTABOUR, a small fortified town of Germany, in the electorate of Treves, between Coblenz and Limburg. E. Lon. 7. 50. N. Lat. 50. 30.

MONTAGNIAC, a considerable town of Asia, in Natolia, and in the province of Bec-Sangel, on the sea of Marmora. It carries on a great trade, especially in fruits, and is seated on a bay of the same name, 12 miles from Bursa, and 60 south-east of Constantinople. E. Long. 29. 40. N. Lat. 40. 20.

MONTAGUE (Edward), earl of Sandwich, an illustrious Englishman, who shone from the age of 19, and united the qualifications of general, admiral, and statesman; yet there were strange inconsistencies in his character. He acted early against Charles I; he persuaded Cromwell, whom it is said he admired, to take the crown; and he was zealous for the restoration of Charles II. All this is imputed to a fond and unaccountable passion which he had for royalty. Upon general Monk's coming into England, he sailed with the fleet to Holland, and soon after he had the honour to convoy his majesty to England. For this he was created knight of the garter; and on the 12th of July 1660 he was created baron Montague of St Neot's in the county of Huntingdon, Viscount

Hinchinbrooke in the same county, and earl of Sandwich in Kent, sworn one of his majesty's most honourable privy-council, made master of the king's wardrobe, admiral of the Narrow Seas, and lieutenant-admiral to the duke of York, as lord high admiral of England.

When the Dutch war broke out in 1694, and the duke of York took upon himself the command of a fleet as high-admiral, his lordship commanded the blue squadron, and by his industry and care abundance of the enemies ships were taken; and in the great battle fought on the third of June 1665, in which the Dutch lost admiral Opdam, and had 18 men of war taken and 14 destroyed, a large share of the honour of the victory was justly given to the conduct of the earl of Sandwich. On the return of the English navy, the command of the whole fleet was given to the earl of Sandwich, which he was ordered to put as speedily as possible in a condition to return to the coast of Holland. Accordingly the earl sailed on the 5th of July with 60 men of war to the Dutch coast; when finding that their East India and Smyrna fleets were to return home north about, he steered for the coast of Norway, and found they had taken shelter in the port of Bergen, where the fleet were attacked: but leaving them there, and sailing back towards the coast of Holland, he met with four Dutch East Indiamen, with several other merchant ships, under a good convoy, and took eight men of war, two of their East India ships, and 20 sail of merchant men; and a few days after, a part of the fleet falling in with 18 of the Hollanders, the greatest part of them were also taken, with four Dutch men of war, and above 1000 prisoners. On his return he was received by the king with distinguished marks of favour; and soon after, he was sent ambassador extraordinary to the court of Madrid, to mediate a peace between the crowns of Spain and Portugal; when he had the happiness to conclude a peace between the two nations to their mutual satisfaction.

On the breaking out of the last Dutch war, his lordship went to sea with the duke of York, and commanded the blue squadron; the French admiral, count d'Estrees, commanding the white. The fleet was at sea in the beginning of the month of May; and coming to an anchor in Southwold-bay in order to take in water, we are told, that on the 27th many officers and seamen were permitted to go on shore, and were at Southwold, Dunwich, and Aldborough; when, the weather being hazy, the earl gave it as his opinion, that, the wind standing as it did, the fleet rode in danger of being surprised by the Dutch; and indeed, between two and three the next morning, they were informed of their approach, upon which his royal highness made the signal for weighing anchor. The blue squadron was out first, the red next, and the white was much aftern. The earl of Sandwich in the Royal James, which carried 100 guns, began the fight, and fell furiously on the squadron of Van Ghent in order to give the rest of his fleet time to form; when captain Brakel, in the Great Holland, attacked the Royal James; but was soon disabled, as were several other men of war, and three fire-ships sunk. By this time most of his men were killed; and the hull of the Royal James was so pierced with shot, that it was impossible to carry her off. In this distress he might have

Montague. been relieved by his vice-admiral Sir Joseph Jordan, had not that gentleman been more solicitous about assisting the duke. When therefore he saw him sail by, heedless of the condition in which he lay, he said to those who were about him, "There is nothing left for us now, but to defend the ship to the last man." Being at length grappled by a fourth fire-ship, he begged his captain Sir Richard Haddock, and all his servants, to get into the boat and save themselves, which they did: yet some of the sailors refused to quit the admiral, and staying endeavoured to extinguish the fire, but in vain; the ship blew up about noon. His lordship's body was found about a fortnight after, and was interred with great state in Henry VII.'s chapel. — We have of his lordship's writing, 1. *The Art of Metals*, in which is declared the manner of their generation, translated from the Spanish of Alvaro Alonzo Barba, 8vo. 2. Several letters during his embassy to Spain, published with Arlington's letters. 3. A letter to secretary Thurloe. 4. Original letters and negociations of Sir Richard Fanshaw, the earl of Sandwich, the earl of Sunderland, and Sir William Godolphin, wherein divers matters between the three crowns of England, Spain, and Portugal, from the year 1663 to 1678, are set in a clear light, 2 vols 8vo.

MONTAGUE (Charles), earl of Halifax, fourth son of George Montague of Harton in Northamptonshire, Esq; son of Henry the first earl of Manchester, was born in 1661. He was educated at Westminster-school and Cambridge, showed very early a most pregnant genius, and quickly made great progress in learning. In 1684, he wrote a poem on the death of King Charles II. in which he displayed his genius to such advantage, that he was invited to London by the earl of Dorset: and upon his coming thither he soon increased his fame, particularly by a piece which he wrote in conjunction with Prior, published at London in 1687, under the title of, "The Hind and the Panther transferred to the Story of the Country-mouse and the City-mouse." Upon the abdication of King James II. he was chosen one of the members of the convention, and recommended by the earl of Dorset to King William, who immediately allowed him a pension of 500*l. per annum*. Having given proofs of his great abilities in the house of commons, he was made one of the commissioners of the treasury, and soon after chancellor of the exchequer: in which post he brought about that great work of recoinage all the current money of the nation. In 1698, he was appointed first commissioner of the treasury; and in 1699 was created a peer of England, by the title of *Baron Halifax* in the county of York. In 1701, the house of commons impeached him of six articles, which were dismissed by the house of Lords. He was attacked again by the house of commons in 1702, but without success. In 1705, he wrote, *An Answer to Mr Bromley's Speech in relation to the occasional Conformity-bill*. In 1706, he was one of the commissioners for the Union with Scotland; and upon passing the bill for the naturalization of the illustrious house of Hanover, and for the better security of the succession of the crown in the Protestant line, he was made choice of to carry that act to Hanover. Upon the death of Queen Anne, when the king had taken pos-

session of his throne, his lordship was appointed first Montague, commissioner of the treasury, and created earl of Halifax and knight of the garter. He died in 1715. His lordship wrote several other pieces besides those above-mentioned; all which, with some of his speeches, were published together in 1716 in an octavo volume.

MONTAGUE (Lady Mary Wortley) accompanied her husband who was sent on an embassy to Constantinople in the beginning of this century. On her return she introduced the practice of inoculation into England, and thence acquired great celebrity. She cultivated the belles lettres; and at one period of her life she was the friend of Pope, and at another his enemy. While they were at enmity with each other, Lady Mary Montague embraced every opportunity of defaming the poet, who well knew how to take revenge. Both of them carried their animosity to so great a height, that they became the subject of public conversation. After a long life, full of singular and romantic adventures, she died about the year 1760. From her we have *Letters*, written during her travels from the year 1716 to the year 1718. They have been translated into French, and published at Rotterdam 1764, and at Paris 1783, one vol. 12mo. They are composed in a lively, interesting, and agreeable style, and contain many curious facts relating to the manners and government of the Turks, which are nowhere else to be found. The Baron de Tott, who lived many years at Constantinople, attacked them with great severity; but they have been defended with equal zeal by M. Guis of Marseilles, who has published a valuable work on Turkey. It need not appear extraordinary, that persons who have visited the same country should not see things in the same light. How few travellers agree in their accounts of the same objects, which they nevertheless pretend to have seen and to have examined with attention.

MONTAGUE (Edward Wortley), son of the former, passed through such variegated scenes, that a bare recital of them would favour of the marvellous. From Westminster-school, where he was placed for education, he ran away three several times. He exchanged clothes with a chimney-sweeper, and he followed for some time that sooty occupation. He next joined himself to a fisherman, and cried flounders in Rotherhithe. He then sailed as a cabin-boy to Spain; where he had no sooner arrived, than he ran away from the vessel, and hired himself to a driver of mules. After thus vagabondising it for some time, he was discovered by the consul, who returned him to his friends in England. They received him with a joy equal to that of the father of the prodigal son in the gospel. A private tutor was employed to recover those rudiments of learning which a life of dissipation, of blackguardism, and of vulgarity, might have obliterated. Wortley was sent to the West Indies, where he remained some time; then returned to England, acted according to the dignity of his birth, was chosen a member, and served in two successive parliaments. His expences exceeding his income, he became involved in debt, quitted his native country, and commenced that wandering traveller he continued to the time of his death. Having visited most of the eastern countries, he contracted a partiality for their manners. He drank little wine; a great deal of coffee; wore a long beard; smoked much; and,

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^{Montaigne.} and, even whilst at Venice, he was habited in the eastern style. He sat cross-legged in the Turkish fashion through choice. With the Hebrew, the Arabic, the Chaldaic, and the Persian languages, he was as well acquainted as with his native tongue. He published several pieces. One on the "Rise and Fall of the Roman Empire." Another an exploration of "The Causes of Earthquakes." As this gentleman was remarkable for the uncommon incidents which attended his life, the close of that life was no less marked with singularity. He had been early married to a woman who aspired to no higher a character than that of an industrious washerwoman. As the marriage was solemnized in a frolic, Wortley never deemed her sufficiently the wife of his bosom to cohabit with her. She was allowed a maintenance. She lived contented, and was too submissive to be troublesome on account of the conjugal rites. Mr Montague, on the other hand, was a perfect patriarch in his manners. He had wives of almost every nation. When he was with Ali Bey in Egypt, he had his household of Egyptian females, each striving who should be the happy she who could gain the greatest ascendancy over this Anglo-Eastern bashaw. At Constantinople, the Grecian women had charms to captivate this unsettled wanderer. In Spain a Spanish brunette, in Italy the olive-complexioned female were solicited to partake the honours of the bridal-bed. It may be asked what became of this group of wives? Mr Montague was continually shifting the place, and consequently varying the scene. Did he travel with his wives as the patriarchs did with their flocks and herds? No such thing. Wortley, considering his wives as bad travelling companions, generally left them behind him. It happened, however, that news reached his ears of the death of the original Mrs Montague the washerwoman. Wortley had no issue by her; and without issue male, a very large estate would revert to the second son of lord Bute. Wortley, owing the family no obligations, was determined, if possible, to defeat their expectations. He resolved to return to England and marry. He acquainted a friend with his intentions; and he commissioned that friend to advertise for any young decent woman who might be in a pregnant state. Several ladies answered it. One out of the number was selected, as being the most eligible object. She waited with eagerness for the arrival of her expected bridegroom; but, behold, whilst he was on his journey, death very impertinently arrested him in his career.

MONTAGUE-Island, one of the Hebrides, in the South Sea, near Sandwich Island. E. Long. 168. 37. S. Lat. 17. 26.

MONTAIGNE (Michel de), a French gentleman, was born in Perigord in 1533. His father educated him with great care, and made him learn Latin as other children learn their mother-tongue. His tutors were Nicholas Gronchi, who wrote *De Comitibus Romanorum*; William Guarenti, who wrote on Aristotle; George Buchanan; and M. Anthony Muret. He was also taught Greek by way of recreation; and because some think that starting children out of their sleep spoils their understanding, he was awakened every morning with the sound of music. He was counsellor for a while in the parliament of Bourdeaux; after-

wards made mayor of Bourdeaux. He published his *Essays*, so much known in the world, in 1580. Montaigne had a great deal of wit and subtlety, but no small share of conceit and vanity. The learned and ingenious are much divided in their opinion about his works. He died in 1592.

MONTALCINO, a small populous town of Italy, in Tuscany, and in the territory of Sienna, with a bishop's see. It is seated on a mountain, 17 miles south-east of Sienna, and 44 south-east of Florence. E. Long. 11. 30. N. Lat. 43. 7.

MONTALTO, an episcopal town of Italy, in the Marca of Ancona; seated on the river Monacio, 10 miles north of Ascoli, and 45 south of Ancona. E. Long. 13. 30. N. Lat. 42. 54.

MONTANINI (Pietro), called *Petrucio Perugino*, an eminent landscape painter, was born at Perugia in 1619. At first he was instructed by his uncle Pietro Barfotti; but was afterwards placed as a disciple with Ciro Ferri. Yet he did not long adhere to the manner of either of those masters, choosing preferably to study under Salvator Rosa; and he imitated the style of that celebrated painter with exceeding great success. The taste of his landscapes was generally admired; the rocks, situations, torrents, and abrupt precipices, were designed with spirit, and in a grand style; and his figures recommended themselves to the eye by a very uncommon correctness, propriety, and elegance. He died in 1689.

MONTANISTS, Christian heretics, who sprung up about the year 171, in the reign of the emperor Marcus Aurelius. They were so called from their leader, the heresiarch Montanus, a Phrygian by birth; whence they are sometimes styled *Phrygians* and *Cataphrygians*.

Montanus, it is said, embraced Christianity in hopes of rising to the dignities of the church. He pretended to inspiration; and gave out, that the Holy Ghost had instructed him in several points, which had not been revealed to the apostles. Priscilla and Maximilla, two enthusiastic women of Phrygia, presently became his disciples; and in a short time he had a great number of followers. The bishops of Asia, being assembled together, condemned his prophecies, and excommunicated those who dispersed them. Afterwards they wrote an account of what had passed to the western churches, where the pretended prophecies of Montanus and his followers were likewise condemned.

The Montanists, finding themselves exposed to the censure of the whole church, formed a schism, and set up a distinct society under the direction of those who called themselves *prophets*. Montanus, in conjunction with Priscilla and Maximilla, was at the head of the sect.

These sectaries made no alteration in the creed. They only held, that the Holy Spirit made Montanus his organ for delivering a more perfect form of discipline than what was delivered by the apostles. They refused communion for ever to those who were guilty of notorious crimes, and believed that the bishops had no authority to reconcile them. They held it unlawful to fly in time of persecution. They condemned second marriages, allowed the dissolution of marriage, and observed three lents.

The Montanists became separated into two branches; one of which were the disciples of Proclus, and the

Montanus other of Æschines. The latter are charged with following the heterodoxy of Praxeas and Sabellius concerning the Trinity.

Monte-falcone.

MONTANUS (Benedict Arias), a most learned Spanish theologian, born in the diocese of Badajoz, about the year 1528. He assisted at the council of Trent with great reputation; and his merit and writings recommended him to Philip II. of Spain, who employed him in publishing a new polyglot bible after the Complutensian edition, which was printed by the care of Cardinal Ximenes. This bible was printed at Antwerp, whither Montanus went in 1571; and on his return to Spain he refused the bishopric which Philip offered him for his reward, but spent the rest of his days at Sevilla, where he died about the year 1598. Montanus had not only vast erudition, but great good sense; he loved solitude, was very laborious, never drank wine, and seldom ate flesh.

MONTARGIS, a considerable town of France, in the Orleanois, and capital of the Gatinois; seated on the river Loir, near a handsome forest, 15 miles south of Nemours, and 62 south of Paris. E. Long. 2. 36. N. Lat. 48. 1.

MONTAUBAN, a considerable town of France, in Guienne, and territory of Quercy, with a bishop's see, and an academy. The fortifications were demolished in 1629, because it took the part of the Huguenots. It is seated on the river Tarn, 20 miles north of Toulouse, and 30 south of Cahors. E. Long. 1. 27. N. Lat. 43. 56.

MONTBAZON, a town of France, in Touraine, with the title of a duchy; agreeably seated at the foot of a hill, on which there is an ancient castle, 135 miles south-west of Paris. E. Long. 0. 45. N. Lat. 47. 17.

MONTBELLiard, a handsome and strong town of France, capital of a province of the same name, between Alsace and the Franche Compté. It is seated at the foot of a rock, on which there is a large, strong castle, in the form of a citadel. The prince of Montbelliard has a voice and seat in the college of the princes of the empire. It was taken by the French in 1674, who demolished the fortifications, but it was restored to the prince. It is seated near the rivers Alaine and Doux, 33 miles west of Basle, and 45 north-east of Bezançon. E. Long. 6. 30. N. Lat. 47. 31.

MONTBLANC, a town of Spain, in the province of Catalonia, 15 miles north of Tarragon. E. Long. 1. 5. N. Lat. 41. 20.

MONTBRISION, a considerable town of France, and capital of Forez, seated on the river Veziza, 40 miles west of Vienne, and 250 south by east of Paris. E. Long. 4. 27. N. Lat. 45. 32.

MONTECCHIO, a considerable town of Italy, in the duchy of Reggio, 10 miles south-east of Parma, and eight north-west of Reggio. E. Long. 15. 54. N. Lat. 38. 8.

MONTE-FALCO, a town of Italy, in the territory of the church and duchy of Spalatto; seated on a mountain near the river Clitunno, 12 miles west of Spalatto. E. Long. 12. 40. N. Lat. 42. 58.

MONTE-Falcone, a town of Italy, in Friuli, with a castle. It belongs to the Venetians, and is near the river Ponzano, 10 miles north-west of Aquileia, and 12 north west of Trieste. E. Long. 13. 0. N. Lat. 46. 4.

leia, and 12 north west of Trieste. E. Long. 13. 0. N. Lat. 46. 4.

MONTE-Faiscone, a small but populous town of Italy, in the territory of the Church, with a bishop's see; seated on a mountain, near the lake Bolsena, in a country abounding with excellent wine, 12 miles south-west of Orvieto, and 45 north-west of Rome. E. Long. 12. 4. N. Lat. 42. 26.

MONTE-Marano, a populous town of Italy, in the kingdom of Naples, and in the Farther Principato; seated on the river Calore, 18 miles south of Benevento. E. Long. 15. 0. N. Lat. 40. 48.

MONTE-Mor-o-novo, or *Monte-major-el-novo*, a considerable town of Portugal, on the road from Lisbon to Badajoz. Long. 9. 35. W. N. Lat. 38. 42.

MONTE-Mor-o-velho, or *Monte-major-el-velho*, a town of Portugal in the province of Beira, with a very large castle, seated in a fertile country, 10 miles south-west of Coimbra, and 83 north of Lisbon. W. Long. 8. 9. N. Lat. 40. 5.

MONTE-Peloso, an episcopal town of Italy, in the kingdom of Naples, and in the Basilicata; seated on a mountain near the river Basiento, 14 miles east of Cirenza. E. Long. 16. 28. N. Lat. 40. 46.

MONTE-Pulciano, a town of Italy, in Tuscany, with a bishop's see; seated on a high mountain, near the river Chiana, in a country noted for excellent wine, 25 miles south-east of Sienna, and 50 south by east of Florence. E. Long. 11. 49. N. Lat. 43. 10.

MONTE-Santo, formerly called *Mount Athos*, a mountain of Turkey in Europe, on the gulph of Contessa. It is called Monte-Santo, or the Holy Mount, because there are 22 monasteries thereon, in which are 4000 monks, who never suffer a woman to come near them. It is 17 miles south of Salonichi. E. Long. 24. 39. N. Lat. 40. 27.

MONTE-Verde, a town of Italy, in the kingdom of Naples, and in the farther Principato, with a bishop's see; 60 miles east of Naples. E. Long. 15. 42. N. Lat. 40. 51.

MONTECUCULI (Raymond de), generalissimo of the emperor's army, and one of the greatest commanders of his time, was born in the duchy of Modena, of a distinguished family, in 1608. Ernest Montecuculi his uncle, who was general of the artillery in the Imperial army, resolved that he should serve first as a common soldier, and that he should pass through all the military degrees before he was raised to command. This the young Montecuculi did with applause. In 1644, when he was at the head of 2000 horse, he surprised by a precipitate march 10,000 Swedes, who laid siege to Nemessau in Silesia, and obliged them to abandon their artillery and baggage; but a short time after, he was defeated and taken prisoner by the general Banier. Having obtained his liberty at the end of two years, he joined his troops to those of John de Wert; and defeated general Wrangel in Bohemia, who was killed in the battle. In 1657 the emperor made him general marshal de camp; and sent him to the assistance of John Casimir, king of Poland. Montecuculi vanquished Ragotzi prince of Transilvania, drove out the Swedes, and distinguished himself in an extraordinary manner against the Turks in Transilvania and Hungary. In 1673 he commanded the Imperial army against the French, and took Bonne; he then proceeded

Monte-faiscone
||
Montecuculi.

Montego-bay II **Montesquieu.** succeeded with feint marches in order to deceive Turenne, in which he obtained great honour. However, the command of that army was taken from him the next year; but it was restored to him in 1675, in order that he might make head against the great Turenne. All Europe had their eyes fixed on these two able warriors, who then made use of all the stratagems which genius and military knowledge were capable of suggesting. The marshal de Turenne was obtaining the superiority when he was taken off by a cannon ball. Montecuculi wept at the death of so formidable an enemy, and bestowed upon him the greatest praises. The great prince de Conde was the only French general that could deprive Montecuculi of the superiority he had obtained by Turenne's death. That prince was therefore sent to the Rhine, and stopped the Imperial general; who considered this last campaign as the most glorious of his life, not from his being conqueror, but for his not being conquered, when he was opposed by a Turenne and a Conde. He spent the rest of his life at the Imperial court; and died at Lintz in 1680. He wrote *Memoirs*; the best edition of which is that of Strasburg, in 1735.

MONTIGO-BAY, a town of Jamaica, and, next to Kingston, the most flourishing in the island, contains above 350 houses; and carries on a very considerable commerce with Great Britain and our remaining colonies in North America. The harbour is capacious; but rather exposed to the north winds, which at certain times in the year blow with great violence. It is the capital of the parish of St James; in which are 70 sugar-plantations, 70 other settlements, and 27,000 slaves.

MONTESA, a very strong town of Spain, in the kingdom of Valentia. It is the seat of an order of knighthood of the same name; and is five miles from Xativa. W. Long. 0. 10. N. Lat. 39. 0.

MONTESQUIEU (Charles de Secondat) baron, a most illustrious Frenchman descended from an ancient and noble family of Guienne, was born at the castle of La Brede, near Bourdeaux, in 1789. The greatest care was taken of his education; and at the age of 20 he had actually prepared materials for his *Spirit of Laws*, by well digested extracts from those immense volumes of civil law which he had studied, not barely as a civilian, but as a philosopher. He became a counsellor of the parliament of Bourdeaux in 1714, and was received president à mortier two years after. In 1721 he published his *Persian Letters*; in which, under the screen of Oriental manners, he satirized those of France, and treated of several important subjects by delicate transient glances: he did not avow this publication; but was no sooner pointed out as the author, than zeal without knowledge, and envy under the mask of it, united at once against the *Persian Letters*. He was received into the French academy in 1728; and having previously quitted his civil employments, he entirely devoted himself to his genius, and was no longer a magistrate, but a man of letters. Having thus set himself at liberty, he travelled through Germany, Italy, Switzerland, Holland, and England, in which last country he resided three years, and contracted intimacies with the greatest men then alive; for Locke and Newton were dead. The result of his observations was, "that Germany was fit to travel in,

Italy to sojourn in, England to think in, and France to live in." On his return he retired for two years to his estate at La Brede, where he finished his work *On the Causes of the Grandeur and Declension of the Romans*; which appeared in 1734. The reputation acquired by this last work only cleared the way for his greater undertaking, the *Spirit of Laws*, which was printed at Geneva in 2 vols 4to. 1750. This was immediately attacked by the adversaries of his *Persian Letters*, in a multitude of anonymous pamphlets; containing all the reproaches to which a liberal mind is exposed from craft and ignorance. M. Montesquieu drew up a defence of this work; which for truth, moderation, and delicacy of ridicule, may be regarded as a model in its way. This great man was peaceably enjoying that fulness of esteem which his great merits had procured him, when he fell sick at Paris, and died on the 10th of February 1755.—The following character of this great man is drawn by Lord Chesterfield. His virtues did honour to human nature, his writings justice. A friend to mankind, he asserted their undoubted and unalienable rights with freedom, even in his own country; whose prejudices in matters of religion and government he had long lamented, and endeavoured, not without some success, to remove. He well knew, and justly admired, the happy constitution of this country, where fixed and known laws equally restrain monarchy from tyranny, and liberty from licentiousness. His works will illustrate his name, and survive him, as long as right reason, moral obligation, and the true spirit of laws, shall be understood, respected, and maintained." As to his personal qualities, we are told by his elogist, M. d'Alembert, that "he was of a sweet, gay, and even temper. His conversation was spirited, agreeable, and instructive. Nobody told a story in a more lively manner, or with more grace and less affectation. He had frequent absence of mind; but always awaked from it by some unexpected stroke that re-animated the languishing conversation. Though he lived with the great, he retired whenever he could to his estate in the country, and there met his books, his philosophy, and his repose. Surrounded at his leisure-hours with peasants, after having studied man in the commerce of the world, he studied him in those simple people solely instructed by nature. With them he cheerfully conversed; he endeavoured, like Socrates, to find out their genius, and appeared as happy with them as in the most brilliant assemblies; especially when he reconciled their differences, and by his beneficence relieved them from their distresses."

Besides the works already mentioned, M. Montesquieu wrote several small pieces, as the *Temple of Gnide*, *Lysimachus*, and *Essay upon Taste*, which is left unfinished. His works have been collected since his death, and printed at Paris in a splendid edition, in quarto. They have likewise all of them been translated into English.

MONTEZUMA, or **MONTECUMA**, was emperor or king of Mexico when Cortez invaded that country in 1518, invited thither, as he pretended, by the inhabitants, whose children Montezuma, in the blindness of his superstition, had sacrificed to his idols. The warlike animals on which the Spanish officers were mounted, the artificial thunder with which they were armed, the wooden castles on which they had crossed

Montesquieu,
Montezuma.

Monte-
zuma
Montferrat

the ocean, the armour with which they were covered, the victories which they gained wherever they went; all these circumstances, added to that foolish disposition to wonder which always characterises a simple people, so operated upon the minds of the Mexicans, that when Cortez arrived at the city of Mexico, he was received by Montezuma as his master, and by the inhabitants as a god. At first they fell down in the streets when a Spanish valet passed by; but by degrees the court of Montezuma grew familiar with the strangers, and ventured to treat them as men. Montezuma, unable to expel them by force, endeavoured to inspire them with confidence at Mexico by expressions of friendship, while he employed secret means to weaken their power in other quarters. With this view, one of his generals, who had private orders to that purpose, attacked a party of the Spaniards who were stationed at Vera-Cruz; and, although his troops were unsuccessful, yet three or four of the Spaniards were killed. The head of one of them was carried to Montezuma. In consequence of this, Cortez did what has been reckoned one of the boldest political strokes that ever was performed. He ran to the palace, followed by fifty of his troops; and, by persuasion and threats, carried the emperor prisoner into the Spanish quarter. He afterwards obliged him to deliver up those who had attacked his troops at Vera-Cruz; and, like a general who punishes a common soldier, he loaded Montezuma with chains. He next obliged him to acknowledge himself in public the vassal of Charles V.; and, in name of tribute for this homage, Cortez received 600,000 merks of pure gold. Montezuma soon afterwards fell a sacrifice to his submission to the Spaniards. He and Alvaro, the lieutenant of Cortez, were besieged in the palace by 200,000 Mexicans. The emperor proposed to show himself to his subjects, that he might persuade them to desist from the attack: but the Mexicans no longer considered him in any other light but as the slave of foreign conquerors. In the midst of his speech, he received a blow with a stone which wounded him mortally; and he expired soon after, A. D. 1520.—See CORTEZ. This unfortunate prince left two sons and three daughters, who embraced the Christian faith. The eldest received baptism, and obtained from Charles V. lands, revenues, and the title of Count de Montezuma. He died in 1608; and his family is one of the most powerful in Spain.

MONTFAUCON (Bernard de), a very learned Benedictine of the congregation of St Maur, singularly famous for his knowledge in Pagan and ecclesiastical antiquities, was born of an ancient and noble family in Languedoc, in 1655. He served for some time in the army; but the death of his parents mortified him so with regard to the world, that he commenced Benedictine monk in 1675, and applied himself intensely to study. Though Montfaucon's life was long, healthy, retired, and laborious, his voluminous publications seem sufficiently to have employed the whole; exclusive of his greatest undertaking, for which he will be always memorable. This was his *Antiquité expliquée*, written in Latin and French, illustrated with elegant plates, in 10 vols folio; to which he added a supplement of 5 vols more. He died at the abbey of St Germain in 1741.

MONTFERRAT, a province of Italy, with the

title of a duchy; bounded on the east by the duchy of Montfort, Milan, and part of the territory of Genoa; on the north, by the Vercellese and Canavese; on the west, by Piedmont properly so called; and on the south by the territory of Genoa, from whence it is separated by the Apennine mountains. It contains 200 towns and castles; and is very fertile and well cultivated, abounding in corn, wine, oil, and silk. It belongs to the king of Sardinia, and Casal is the capital town.

MONTFORT, a town of France, in Upper Bretagne, seated on the river Men, 12 miles from Rennes. W. Long. 1. 58. N. Lat. 48. 8.

MONTFORT, an handsome and strong town of the Netherlands, in the United Provinces, with an ancient castle; seated on the river Yssel, seven miles from Utrecht. E. Long. 5. 0. N. Lat. 52. 4.

MONTFORT, a town of Germany, in the circle of Suabia, on the confines of Tirol, 16 miles south of Lindow, and the lake Constance. It is capital of a country of the same, which has been almost all purchased by the house of Austria. E. Long. 9. 51. N. Lat. 47. 22.

MONTFORT-DE-LEMONS, an ancient town of Spain, in the kingdom of Galicia, with a magnificent castle, where the Comarca of Lemos resides. It is seated in a fertile country, 25 miles north-east of Orensa, and 55 south-east of Compostella. W. Long. 7. 9. N. Lat. 42. 28.

MONTFORT-L'AMULY, a town in the Isle of France, with the title of a duchy, 25 miles from Paris. E. Long. 2. 50. N. Lat. 48. 45.

MONTFORT (Simon Count de), descended from an illustrious and flourishing family, was lord of a small town of the same name ten leagues from Paris. He was one of the greatest generals of the age in which he lived; and he displayed his bravery in a voyage beyond seas, and in the wars with the English and Germans. The strength of his constitution enabled him to support without inconvenience the severest labours of the field: his majestic stature distinguished him in the midst of the battle; and the motion of his sword was sufficient to strike terror into his boldest enemies. In the greatest dangers he possessed the utmost coolness and presence of mind: he observed every emergency; and was ready to bring assistance, while he himself was employed in attacking the bravest who made head against him. He was appointed to conduct the crusade against the Albigenes in 1209; and the name of Simon de Montfort is highly celebrated in this war. He took Beziers and Carcassonne, raised the siege of Castelnaud, and gained a great victory in 1213 over Peter king of Arragon, Raimond VI. count of Toulouse, and the counts de Foix and de Cominge. Simon de Montfort was killed at the siege of Toulouse on the 25th of June 1213, by a blow with a stone discharged by the hands of a woman.—Such was the fate of one who had sullied the glory of his victories by the cruelty of his executions.—Some historians have given him the name of *Macca-beus* and of *Defender of the Faith*; but men, animated with the true spirit of Christianity, have revolted against such titles. “We cannot (says the Abbé Nonotte) read the accounts of his severity, or rather cruelty, towards the Albigenes without horror. He was not guided by the spirit of the religion of Je-
su

Montgatz, sus in the massacre of Beziers, the pillage of Carcassonne, and the taking of Lavaur. But our horror is somewhat diminished by the consideration of the dreadful revolt, and massacres committed by the Albigenses themselves." Simon de Montfort treated them at the best with as great cruelty as they had done the Catholics. His younger son afterwards made a great figure in England, and is known by the title of Earl of Leicester.

MONTGATZ, a town of Lower Hungary, in the county of Peczaz, with a fortress composed of three castles, seated on a craggy rock. It is encompassed with a great morass, and art and nature have rendered it almost impregnable. It was defended by the Princess Ragotsky, wife of Count Tekeli, when besieged by an army of the Imperialists, who were obliged to raise the siege in 1688.

MONTGERON (Louis-Basile-Carré de), was born at Paris, A. D. 1686; his father was master of requests. He was scarcely 25 years of age when he purchased the place of counsellor in parliament, where by his wit and external qualifications he gained considerable reputation. Deeply engaged in all the vices which flow from irreligion, he was converted by an unexpected circumstance. He went on the 7th of September 1731 to the tomb of Deacon Paris, with an intention to examine, with the rigour of the severest critic, the miracles which were reported to be performed there. But, according to his own account, he felt himself suddenly beat to the earth by innumerable flashes of light with which he was surrounded. His incredulity was converted into flaming zeal, and he became the apostle of the saint whom he formerly ridiculed. From that moment he devoted himself to the fanaticism of *convulsions*, with the same impetuosity of character with which he had run into the most shameful excesses. He had not long been the disciple of Jansenism when he suffered persecution. When the chamber of inquests was banished in 1732, he was sent into the mountains of Auvergne; which, instead of cooling, tended rather to inflame his zeal. During his exile, he formed the plan of collecting the proofs of the miracles wrought at the tomb of the Abbé Paris, and of composing what he called a *Demonstration of them*. On his return to Paris, he prepared to execute this plan; and on the 29th of July 1737, he actually presented to the king at Versailles a volume in quarto superbly bound. This work he accompanied with a speech, which is a mixture of zeal and argument in a tolerable style. In consequence of this work, which some consider as a masterpiece of eloquence, and others as a mass of absurdities, he was committed to the Bastille. After a few months confinement, he was sent to an abbey of Benedictine monks in the diocese of Avignon; whence he was, in a short time, carried to Viviers. He was afterwards confined in the citadel of Valence, where he died, A. D. 1754, aged 68. The work which he presented to the king was entitled *La vérité des Miracles opérés par l'intercession de M. Paris, &c. &c.*—The critics, even to this day, seem to be guided in their opinion concerning this book either by hatred or by enthusiasm. "It would be extremely rash (says the Abbé de St Pierre, in the second volume of his *Annales*, p. 593.) to maintain with the Molenists, that no miraculous cure was ever performed at the tomb

of the Abbé Paris; and to say with the Jansenists, that these cures were performed by a supernatural power, would be the height of fanaticism. The truth is (adds the same author), that no miracle appears ever to have been performed at this tomb except in the cure of the human body; in all other cases, there would have been the want of that imagination on which the whole miracle depended." Thus, although Montgeron ventured to compare these prodigies with the miracles of Jesus Christ and his apostles, yet we find no person raised from the dead, no multiplication of loaves, no command obeyed by the elements, and no blind or deaf restored to their sight or hearing. It belongs to the Author of nature alone, or to those who have derived power from him, to work such miracles as are recorded by the evangelists, or in the history of the apostles. Montgeron added a second and third volume on the same subject: he left also in manuscript a work which he composed in prison *contre les Incrédules*. Religion, it must be confessed, has had much more powerful advocates. Fortunately Pascal and Bossuet are among the number: and it could well have wanted both Paris and Montgeron, whatever virtues they might possess in other respects.

MONTGOMERY, the capital of a county of the same name in North Wales, 158 miles from London, took its name from Roger de Montgomery earl of Shrewsbury, who built the castle: but it is called by the Welsh *Tre Valdwyn*, that is, Baldwin's town; having been built by Baldwin, lieutenant of the marches of Wales, in the reign of William I. The Welsh, after having put the garrison to the sword, demolished it in 1095; but Henry III. rebuilt it, and granted it the privileges of a free borough, with other liberties. It is a large and tolerably well built town, in a healthy situation and fertile soil. It sends a member to parliament, and has the title of an earldom. It had formerly a tower and castle; but they were demolished in the civil wars. It has a weekly market, and four fairs.

MONTGOMERY (Gabriel de), count de Montgomery in Normandy, was remarkable for his valour and noble achievements, but still more so for being so unfortunate as to put out the eye of Henry II. on the 29th of June 1559. That prince having engaged several knights in a tournament, given by him on occasion of the marriage of his daughter the princess Elizabeth with Philip king of Spain, at last wished to break a lance with the young Montgomery, at that time lieutenant of the Scotch guard. Montgomery, as if he had foreseen the fatal consequences, again and again declined the combat, and it was with great reluctance he at length yielded, when he saw the king about to take offence at his refusal. In the course, his lance broke in the king's visor, and wounded him in the eye. Henry died on the 11th day after receiving the wound, and gave orders on his death-bed that Montgomery should not be prosecuted, or harassed in any respect, on account of what had happened. After this unlucky accident, Montgomery retired for some time to his estate in Normandy. He next visited Italy and other foreign countries; and did not return to France till the commencement of the civil wars, when he joined the party of the Protestants, and became one of their principal leaders. In 1562, he defended Rouen against the royal army with great valour and obstinacy. The city being at length taken by storm, he

Montgomery.

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he threw himself into a galley; and having, with equal temerity and good fortune, surmounted by dint of rowing a chain which had been thrown across the Seine at Candebec for the purpose of preventing succours from England, he escaped to Havre. In 1569 Montgomery was sent to the assistance of Bearn, which the Catholics, under the command of Terrides, had almost entirely wrested from the hands of Jane d'Albret, queen of Navarre. He executed this commission with so great dispatch, that Terrides was obliged to raise the siege of Navarreins, and to retire with great precipitation to Orthez. Montgomery pursued him to this city, which he took by assault; and before Terrides had time to recover himself, he and his principal officers were taken prisoners in the castle. After this defeat, the rest of Bearn submitted to the conqueror wherever he made his appearance. This expedition acquired him the greatest glory, and has been celebrated by the Catholic no less than by the Protestant historians. He was at Paris at the time of the massacre on St Bartholomew's day 1572, and lodged in the Faubourg St Germain. Some accident having retarded the execution in that quarter, he was informed of it at the very moment when it was about to begin; and he had just sufficient time to mount his horse, and, in company with some Protestant gentlemen who lodged near him, to make his escape at full gallop. They were pursued as far as Montfort-l'Amaury; and Montgomery, whose escape alone is particularly attended to, owed his safety on this occasion to the swiftness of his horse, which, according to a manuscript of that time, carried him 30 leagues without halting. Having escaped this danger, he took refuge with his family, first in the island of Jersey and afterwards in England. The following year, Montgomery carried a considerable fleet, which he had armed and fitted out in England, partly on his own credit and partly on that of the inhabitants of Rochelle, to the relief of that city, which was at that time besieged by the Catholics: But, whether distrusting his forces, or for other reasons about which historians do not agree, he left the road without fighting the Catholic fleet, and went to pillage Belleisle on the coast of Brittany. Having disbanded his fleet, he returned to England to Henry de Champenon his son-in-law, coast-admiral of Cornwall. On the renewal of the war in France in 1573, Montgomery, who was then in Jersey, passed over into Normandy, and joined the Protestant nobility of that province. Matignon, lieutenant-general in Lower Normandy, to whom Catharine de Medicis had given a particular charge to use his utmost endeavours to seize the person of the Count, came unexpectedly upon him in Saint-Lo, and laid siege to that city. On the evening of the fifth day of the siege, Montgomery left Saint-Lo with between 60 and 80 horse, forced the guard in the suburbs, and escaped amid a shower of musket bullets, without losing a single man, leaving the command of the place to Coulombieres, François de Briqueville. Montgomery arrived at Domfront May 7. 1574, with only twenty followers, intending to make no longer a stay in that place than was necessary to recruit them after the fatigues of so rapid a march. The same day he was joined by several gentlemen, who brought to his assistance a company of forty horse.—Meanwhile Matignon, informed of his escape, and en-

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raged at having lost his prey, flew at the head of a party of horse, with some companies of foot mounted on horseback, and arrived on the morning of the 9th before Domfront. He blocked up the place on all sides till the infantry and cannon which followed him should arrive. On their arrival, he attacked the city with great violence; and, as it was impossible to defend it, Montgomery was soon obliged to retire into the castle with the garrison, amounting to no more than 150 men, including 80 foot soldiers who guarded the city when he entered it. He sustained a furious assault, fought with the greatest boldness and obstinacy, and exposed himself in the breach like one who wished for death. Perceiving, however, that his soldiers, partly by the fire of the enemy, and partly by constant desertion, were reduced almost to nothing, he capitulated on the 27th of May. Many Protestant historians affirm, that the articles of capitulation were violated with regard to Montgomery; but, not to mention the testimony of others, it appears evident, from the authority of D'Aubigny himself, who of all the Protestant writers is most worthy of credit, that the Count had no promise from Matignon, except personal safety and good treatment while he continued his prisoner. This general gave him no assurance of pardon from the king or the queen-mother. After the capture of Domfront, Matignon conducted his prisoner to Saint-Lo, the siege of which was still going on, in hopes that he might have some influence with his former friend and fellow-soldier to persuade him to surrender. For this purpose, Montgomery was brought to the side of the ditch; and he exhorted Coulombieres, who appeared on the wall, to follow his example. But Coulombieres, full of indignation, reproached him in the severest and most upbraiding terms for his cowardice in entering into a shameful capitulation, instead of dying in the breach like a soldier, with his sword in his hand. This intrepid governor spoke the true sentiments of his heart; for when the assault was made some days after, he was killed defending the breach. In the mean time, Matignon received orders from Catharine de Medicis, now regent of the kingdom by the death of Charles IX. to send Montgomery to Paris under a strong guard. When he arrived there, he was conducted to the gaol belonging to the parliament, and confined in the tower which still bears his name. Commissioners were appointed by the queen to conduct his trial. He was interrogated concerning the conspiracy imputed to the admiral Coligny; but the principal charge on which his condemnation was founded, was his hoisting the English flag on board those ships which he intended for the relief of Rochelle. The sentence by which he was condemned also deprived his children of the title of nobles. When Montgomery heard this part of the sentence read, *If they have not the virtue of nobles to retrieve this loss* (said he), *I consent to their degradation.*—After undergoing a very severe torture, he was carried to the place de Greve, dressed in mourning, and there beheaded on the 26th of June 1574. D'Aubigny, who was present at his execution, and who stood immediately behind Fervaques, says that he appeared on the scaffold with a firm and undaunted countenance; and gives us a pretty long speech which he delivered on that occasion, addressing himself first to the spec-

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tators on one side of the river, and then to those on the other. When he had finished his speech, he fell down on his knees beside the block; bade adieu to Fervaques, whom he perceived in the crowd; requested the executioner not to cover his eyes; and submitted to his fate with a constancy truly admirable.

Montgomery has always been considered as a victim to the unjust revenge of Catherine de Medicis. It is evident that he could not be prosecuted or punished for the death of Henry II.; but it has been said, that, after a misfortune of this kind, which was productive of so many calamities to the state, Montgomery was much less excusable than the other Protestants, in carrying arms against his sovereign, the son of that very king of whom he had deprived France. This consideration is mentioned by the Catholics as one reason for diminishing our concern at the tragical death of this illustrious hero. Montgomery married in 1549 Elisabeth de la Fouche of a noble family in Brittany: he left several children, but their number is not exactly known.

He was the eldest son of *James de Montgomery*, Seigneur de Lorges in the Orleanois, one of the bravest men of his age, and famous under the name of *Lorges* in the wars of Francis I. In 1545 he succeeded John Stuart count d'Aubigny in the command of the hundred archers in the Scotch guard; and his son was lieutenant, or perhaps captain, in survivancy when he killed Henry II. It is singular that the same Lorges, father of Montgomery, had wounded Francis I. in the chin with a firebrand, in some frolic with that prince. This accident occasioned the wearing of long beards in France for 50 years. Lorges died aged above 80, a short time after Henry II. He obtained the title of count de Montgomery in 1453, pretending that it belonged to his ancestors, and that he was descended, by the earls of Eglinton in Scotland, from a younger son of the ancient house of Montgomery established in England. According to a memoir given by the family to the author of the Genealogical Dictionary, James was the son of Robert Montgomery, who left Scotland and entered into the service of the French king about the beginning of the reign of Francis I. and this Robert was grandson to Alexander Montgomery, cousin by the mother's side to James I. king of Scotland.

MONTGOMERYSHIRE, a county of North Wales, 40 miles in length and 37 in breadth; bounded on the north by Merionethshire and Denbighshire, on the north-east and east by Shropshire, on the south by Radnorshire and Cardiganshire, and on the west by the last mentioned county and part of Merionethshire. It is divided into six hundreds; and contains six market-towns, 47 parishes, about 5660 houses, and 33,960 inhabitants. It lies in the three several dioceses of St Asaph, Bangor, and Hereford; but sends only two members to parliament, one for the county, and one for the town of Montgomery. The air is pleasant and salubrious; but this county, being extremely mountainous, is not very fertile, except in the valleys, which afford some corn and plenty of pasture; however, the south, south-east, and north-east parts, being much more level, are extremely fruitful, especially a pleasant vale, through which the Severn glides in beautiful meanders.

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MONTH, the twelfth part of a year. See CHRONOLOGY, n^o 17. Month.

MONTH, in its proper acceptation, is that space of time which the moon takes up in passing from any certain point to the same again, which is called a *periodical month*; or it is the space of time between two conjunctions of the moon with the sun, which is called a *synodical month*. That space of time which the sun takes up in passing through one sign or 12th part of the zodiac, is also called (but improperly) a *month*. So that there are two sorts of months; *lunar*, which are measured by the moon; and *solar*, which are measured by the sun. The lunar periodical month consists of 27 days, 7 hours, 43 minutes, 5 seconds: The lunar synodical month is 29 days, 12 hours, 44 minutes, 3 seconds, and 11 thirds. A solar month contains, upon a mean calculation, 30 days, 10 hours, 29 minutes, 5 seconds.

The Jews, Greeks, and Romans, made use of lunar synodical months; but, to avoid fractions, they consisted alternately of 29 and 30 days. The former, the Romans called *cavi*, and the Greeks *χοίλοι*; the latter were termed *pleni* and *πληρεις*.

1. The Hebrew months were ranged differently in their sacred and in their civil year.

Order of the sacred Year.				Order of the civil Year.			
1	Nisan	Answering to our	Mar.	1	Tifri	Answering to our	Sep.
2	Fiar		Apr.	2	Marshevan		Oct.
3	Sivan		June	3	Casleu		Nov.
4	Thammuz		May	4	Thebet		Dec.
5	Ab		July	5	Sebat		Jan.
6	Elul		Aug.	6	Adar		Feb.
7	Tifri		Sep.	7	Nisan		Mar.
8	Marshevan		Oct.	8	Fiar		Apr.
9	Casleu		Nov.	9	Sivan		May
10	Thebet		Dec.	10	Thammuz		June
11	Sebat		Jan.	11	Ab		July
12	Adar		Feb.	12	Elul		Aug.

These months being lunar cannot exactly answer to our solar months; but every Jewish month must be conceived to answer to two of ours, and partake of both. As these 12 lunar months consisted only of 354 days, the Jews, in order to bring it nearer to the true year, took care every three years to intercalate a 13th month into the number, which they called *ve-adar*, or the second *adar*. The new moon was always the beginning of the month; and it is said the Jews had people posted on elevated places, to give notice to the Sanhedrim as soon as she made her appearance: After this, proclamation was made by found of trumpet, and "the feast of the new moon, the feast of the new moon," resounded amongst the people.

The ancient Hebrew months were of 30 days each, excepting the last, which consisted of 35; so that the year contained 365 days, with an intercalary month at the end of 120 years, which, by absorbing the odd hours which remained at the conclusion of each year, brought it back nearly to its proper place. This regulation of the year was borrowed from the Egyptians.

2. The months of the Athenian year, as we have before observed, consisted alternately of 29 and 30 days. The first month, according to Meton's reformation of the kalendar, began with the first new moon after the summer solstice, and was called *hecatombeon*, answering to the latter half of June, and the

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Month. former half of July. The order of the months, with the number of days in each, are as follows :

1 <i>Hecatomæon</i> ,	30	7 <i>Posideon</i> ,	30
2 <i>Metagilnion</i> ,	29	8 <i>Gamelion</i> ,	29
3 <i>Boedromion</i> ,	30	9 <i>Elaphebolion</i> ,	30
4 <i>Mamakterion</i> ,	29	10 <i>Munichion</i> ,	29
5 <i>Panephsion</i> ,	30	11 <i>Thargelion</i> ,	30
6 <i>Anthesterion</i> ,	29	12 <i>Scirrophorion</i> ,	29

Each month was divided into three decades of days called *δεκάμερα*. The first was called *Μηνος αρχομενν* or *ισαμενν*, or the decade of the beginning of the month; the second was *Μηνος μεσσην* or the decade of the middle; and the third was *Μηνος φθινον*, *παυομενν* or *ληγον*, the decade of the expiring month.

The first day of the first decade was termed *Νεομηνια*, because the first month began with the new moon; the second day was *δευτερα ισαμενν*; the third *τρίτη ισαμενν*, &c. The first day of the second decade was *πρωτη μεσσην*, the second *δευτερα μεσσην*, &c.—the days of this decade were also called *πρωτη επι δεκα*, *δευτερα επι δεκα*, &c. The first day of the third decade was *πρωτη επι ικαδι*; the second was *δευτερα επι ικαδι*, &c. i. e. the first, second, &c. after 20, because the last decade began on the 20th day. This decade was also counted by inversion thus; *φθινον δεκατη* the 21st, *φθινον εννατη* the 22d, *φθινον ογδοη* the 23d, and so of the rest to the last day of the month, which was called *ενη και νεα*, the old and the new, because one part of that day belonged to the old and the other to the new moon; but after the time of Demetrius, the last day of the month was called from him *Δημητριας*; it sometimes was named *τριακας*.

The Grecian months, thus consisting of 29 and 30 days alternately, fell short of the solar year 11 days 6 hours. To remedy this defect the cycle of four years, called *τετραετης*, was invented.—In this cycle, after the first two years, they added an intercalated month called *εμβολιος*, consisting of 22 days; and again, after the expiration of two years more, they inserted another month of 23 days, the fourth part of a day having in the space of four years amounted to a whole year. See YEAR.

3. The Roman year under Romulus consisted of 10 months only, and began with March, which contained 31 days, then followed April which had 30, May 31, June 30, *Quintilis* 31, *Sextilis* 30, September 30, October 31, November 30, December 30. These 10 months containing no more than 304 days, this account was in a short time found to be deficient. Numa Pompilius, therefore, took away one day from each of these six months, April, June, *Sextilis*, September, November, December; and to the six days thus obtained he added 51, which was the number that Romulus's year, in his opinion, wanted to make it perfect. Numa had now 57 days to dispose of; he therefore divided them, and constituted two other months, January and February; the former consisting of 29 and the latter of 28 days. The month of January, which he placed at the winter solstice, he made instead of March to begin the year. Thus Numa's year consisted of 355 days: but this being found 11 days 6 hours short of the solar year, he made use of the intercalation of 90 days at the expiration of eight years perpetually; which number, being made up of the 11 days and a quarter, kept the year pretty well to its place. The beginning of the year in Julius Cæsar's time had anticipated its true place 67 whole

days: these he intercalated betwixt November and December; so that the year consisted, for this one time, of 15 months or 445 days. This reformation was called the *Julian correction*, and this year the *year of confusion*. At the end of 12 years, by the ignorance of priests, who did not understand intercalation, 12 days had been intercalated for nine. This was observed by Augustus Cæsar, and rectified, by ordering 12 years to pass without any intercalary days. The order and succession of months was the same as that of Numa: But January, March, May, *Quintilis*, *Sextilis*, October, and December, had each 31 days; April, June, September 30, and February, in common years, 28; but every fourth year or bissextile 29. This, with a very little difference, is the account observed at present. *Quintilis*, in compliment to Julius Cæsar, was called *July*, because in this month he was born; and *Sextilis*, in honour of Augustus, was called *August*; both which names are still continued.—See YEAR.

Each month by the Romans was divided into *kalends*, *nones*, and *ides*, all of which were reckoned backwards. The *kalends* were the first day of the month. The *nones* fell on the seventh, and the *ides* on the 15th, of March, May, July, October—but in all other months the *nones* were on the fifth, and the *ides* on the 13th. For the more easy comprehension of the Roman manner of dating, according to this division of the months, here follows a table.

	March May July October	January August December	April June September November	February
1	<i>Kalendæ</i>	<i>Kalendæ</i>	<i>Kalendæ</i>	<i>Kalendæ</i>
2	6	4	4	4
3	5	3	3	3
4	4	<i>Prid. Non.</i>	<i>Prid. Non.</i>	<i>Prid. Non.</i>
5	3	<i>Nonæ</i>	<i>Nonæ</i>	<i>Nonæ</i>
6	<i>Prid. Non.</i>	8	8	8
7	<i>Nonæ</i>	7	7	7
8	8	6	6	6
9	7	5	5	5
10	6	4	4	4
11	5	3	3	3
12	4	<i>Prid. Idus</i>	<i>Prid. Idus</i>	<i>Prid. Idus</i>
13	3	<i>Idus</i>	<i>Idus</i>	<i>Idus</i>
14	<i>Prid. Idus</i>	19	18	16
15	<i>Idus</i>	18	17	15
16	17	17	16	14
17	16	16	15	13
18	15	15	14	12
19	14	14	13	11
20	13	13	12	10
21	12	12	11	9
22	11	11	10	8
23	10	10	9	7
24	9	9	8	6
25	8	8	7	5
26	7	7	6	4
27	6	6	5	3
28	5	5	4	<i>Prid. Kal.</i>
29	4	4	3	
30	3	3	<i>Prid. Kal.</i>	
31	<i>Prid. Kal.</i>	<i>Prid. Kal.</i>		

N. B. Every leap year, February consisting of 29 days, the 24th and 25th of that month are written *sexto Kal. Mart.*; hence leap year is called *Bissextilis*.

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MONTIA, in botany: A genus of the trigynia order, belonging to the triandria class of plants; and in the natural method ranking with those with which the order is doubtful. The calyx is diphyllous; the corolla monopetalous and irregular; the capsule unilocular and trivalved.

MONTINIA, in botany: A genus of the tetrandria order, belonging to the dioecia class of plants. The perianthium of the male is quadridented superior; and there are four petals. The female calyx and corolla are as in the male; the filaments barren; the style bifid; the capsule oblong and bilocular.

MONTMEDI, a small but strong town of France, in Luxemburg, seated on the river Chire, which divides it into the upper and lower towns. It is 22 miles south-east of Sedan, 27 south-west of Luxemburg, and 135 north-east of Paris. E. Long. 5. 23. N. Lat. 49. 32.

MONTMORENCI (Francois Henry de.) See LUXEMBURG.

MONTMORENCY, a town of France, with the title of a duchy, remarkable for the tombs of the dukes of this name. It is seated on a hill, near a large valley, fertile in fruits, especially excellent cherries. E. Long. 2. 24. N. Lat. 48. 59.

MONTMORENCY (Anne de), a peer, marshal, and constable, of France, and one of the greatest generals of the 16th century, defended, in 1512, the city of Menziers against the emperor Charles V. and obliged the count of Nassau to raise the siege. The following year he was made marshal of France; and in 1525, following king Francis I. into Italy, he was taken with that prince at the battle of Pavia, which was fought contrary to his advice. The important services he afterwards rendered the state were rewarded by the sword of constable of France, with which he was presented by the king on the 10th of February 1538. He afterwards underwent various revolutions of fortune both at court and in the field. At last, being wounded at the battle of St Denis, which he gained on the 10th of November 1567, he died of his wounds two days after, at 74 years of age. It is said, that a cordelier attempting to prepare him for death, when he was covered with blood and wounds, after the battle of St Denis, he replied in a firm and steady voice: "Do you think that a man who has lived near 80 years with honour, has not learnt to die for a quarter of an hour?"

MONTPELIER, one of the handsomest towns of France, and the most considerable in Languedoc excepting Tholouse, is situated in E. Long. 4. 20. N. Lat. 45. 58. It hath a citadel, a bishop's see, an university, a royal academy of sciences, and a mint. This town has been long famous for a salubrious air and skilful physicians. In reality the air may be salutary in catarrhus consumptions from its dryness and elasticity; but it is too sharp in cases of pulmonary imposthumes. The climate, according to some late travellers, is so much altered for the worse, that the inhabitants themselves scarce know it to be the same: it has been changing many years, and every year becomes worse and worse. It has been known to rain almost three months without intermission; and at intervals such thick stinking fogs, as nothing but the banks of Newfoundland could equal; and several times, for two

or three days on a stretch, the sky is so heavily loaded, that neither sun, moon, nor star, can be seen. In summer it is so insufferably hot, that till the cool of the evening there is no stirring out. Its situation, though on an eminence, never could be healthy; as between it and the Mediterranean (which is about three leagues distant) it is one continued marsh and swamp, ever covered with noxious vapours, which, when the sea-breeze sets in, blows directly on the town and the country adjacent; of the sad effects of which, its unhealthy inhabitants, with their yellow meagre looks, are the most convincing proofs.

The town has nothing curious to induce a stranger to stay longer in it than three or four days, except he arrives there about Christmas; at which time it is very gay, as all the nobility of Languedoc meet there at that time to settle the affairs of the province, though it is not the capital, but esteemed nearly the centre. There is during that time a play, which, with an indifferent concert, are all the public amusements. The people in trade are reputed by the French themselves to be the greatest extortioners, and sure not to let a penny escape them, be the means to come at it ever so unjust: as an instance, they had the conscience to charge an English sea officer that died there, 300 livres (twelve guineas and a half) for eight days lodging.

This city stands upon a rising ground fronting the Mediterranean, which is about three leagues to the southward: on the other side is an agreeable plain, extending about the same distance towards the mountains of the Cevennes. It is reckoned well built, and what the French call *bien percée*; yet the streets are in general narrow and the houses dark. The inhabitants are supposed to amount to 40,000: they are sociable, gay, and good tempered, and they trade very largely in wine, cordials, oil, verdigrease, and salt petre. They have several manufactures in silk and woollen goods. There are many Protestants here and at Nismes. The markets are well supplied with fish, poultry, butcher's meat, and game, at reasonable rates. The wine of the country is strong and harsh: Burgundy is dear, and so is the sweet wine of Frontignan, though made in the neighbourhood of Cette. Liquors of various sorts are compounded and distilled at Montpellier. The environs are extremely pleasant, having on one side La Place de Peyrou, which forms a fine terrace. From thence, on a clear day, may be seen to the eastward the Alps, which form the frontiers of Italy; to the south-west, the Pyrenean mountains, which form those of Spain, each esteemed fifty leagues distant; and to the southward a most extensive view of the Mediterranean. Not far from thence is a noble aqueduct, built like two bridges one above the other; by this water is brought from a mountain at three leagues distance, into two basins in a small elegant temple at the west end of the place; and the king's garden, where on certain days public lectures are held on botany. On the other side of the town is the esplanade, a beautiful walk, bordered on each side by olive trees, from whence there is a pleasing prospect of the sea and the country adjacent to the town; near which is the citadel, a place of no strength, though well walled in, as it is commanded by several rising grounds, and has only a dry ditch. There are commonly kept there four battalions of infantry. —

Montreal. Should an Englishman choose to reside here any time, the Grande Rue, that is the great street, is the genteelst quarter to reside in, where 12 or 18 livres a month is the price for a genteel chamber, which in the time of the states would let for 60; and if he does not choose to mess with the officers, there is a genteel ordinary, where the English commonly eat, in the Rue d'Argenterie, which is contiguous to your lodgings. Families who reside here find their account in keeping house; and every traveller who designs to stay longer than a day or two in any of these towns, will do well to write beforehand to his correspondent to procure furnished lodgings, to which he may be driven immediately, without being under the necessity of lying in an execrable inn, where he must pay four livres a head for every meal, and six livres a day for an apartment.

MONTREAL, an island of North America, in the river St Laurence, about six leagues and a half in length, and three leagues over in the broadest parts. It belonged to the French; but was taken by the generals Amherst and Murray on the 8th of September 1760, without firing a gun. According to the terms of capitulation, all the French forces were to be sent to Old France; and consequently all Canada became subject to the crown of Great Britain; which cession was confirmed by the peace of 1763. The soil of the island is exceedingly rich and good, producing all kinds of European fruits and vegetables in great abundance, with variety of garden fruits. The south side is the most inhabited, of course best cultivated; and besides the settlements, which are numerous, the island is adorned with villas, for the retirement of the more wealthy merchants during the summer season. No Indians are settled here; nor are they fond of settling on islands, from an hereditary distrust lest they should be cut off by the Europeans. Since this place has been in the possession of Britain, it has suffered much by fires, the houses being mostly built of wood.

The town of **MONTREAL**, situated on this island, and formerly called *Ville Marie*, is the second place in Canada for extent, buildings, and strength; and besides possessing the advantage of a less rigorous climate, for delightfulness of situation is infinitely preferable to Quebec. It stands on the side of a hill, sloping down to the south, with many agreeable villas upon it, which, with the island of St Helen, and the river (which is here about two miles broad), form a most charming landscape. Though the city is not very broad from north to south, it covers a great length of ground from east to west, and is nearly as large and populous as Quebec. The streets are regular, forming an oblong square; the houses well built, and in particular the public edifices, which far exceed those of the capital in beauty and commodiousness; the residence of the knights hospitallers being extremely magnificent.—There are several gardens within the walls, in which, however, the proprietors have consulted use more than elegance, particularly those of the Sisters of the Congregation, the Nunnery Hospital, the Recollets, Jesuits Seminary, and Governor. Besides these, there are many other gardens and beautiful plantations without the gates, as the garden of the General Hospital, and the improvements of Mr Liniere, which exceed all the rest, and are at an agreeable distance on the north side of the town. The three churches and re-

ligious houses are plain, and contain no paintings, nor any thing remarkably curious, but carry the appearance of the utmost neatness and simplicity. The city has six or seven gates, large and small; but its fortifications are mean and inconsiderable, being encompassed by a slight wall of masonry, sufficient only to overawe or prevent a surprise from the numerous tribes of Indians with whom they are surrounded, and who used to resort in vast bodies to the annual fair held here, which continued from the beginning of June till the latter end of August, when many solemnities were observed, at which the governor assisted, and guards were placed to preserve good order among such a concourse of different savage nations, all of whom are extremely fond of spirituous liquors, and when drunk commit great excesses. The fortifications were by no means capable of sustaining a regular attack; and though the garrison in 1760 consisted of eight battalions of regular troops, a numerous militia, and a great body of savages, M. Vaudreuil and Chevalier de Levis submitted without firing a gun. There are no guns mounted on the wall; only a dry ditch surrounds it, about seven feet deep, encompassed with a regular glacis. On the inside of the town is a cavalier on an artificial eminence, with a parapet of logs or squared timbers and six or eight guns, called the citadel. Such is the strength of Montreal, the number of whose inhabitants may be between 5000 and 6000, extremely gay and well dressed. By the situation of the place, the inhabitants are well supplied with all kinds of river fish, some of which are unknown to Europeans, being peculiar to the lakes and rivers of this country. They have likewise plenty of black cattle, horses, hogs, and poultry. The neighbouring shores supply them with a great variety of game in the different seasons; and the island abounds with well tasted soft springs, which form a multitude of pleasant rivulets. The city now drives a considerable trade in furs, &c. and vessels of 200 tons can come up to it. It stands 60 leagues above Quebec.

MONTREAL, a town of Spain, in the kingdom of Arragon, with a castle, seated on the river Xiloca, 25 miles N. W. of Tervil, and 40 S. E. of Calataud.—W. Lon. 1. 2. N. Lat. 41. 9.

MONTREAL, a town of Italy, in Sicily, and in the valley of Mazara, with an archbishop's see; seated on a rivulet, five miles W. of Palermo, and 50 N. E. of Mazara. E. Lon. 13. 31. N. Lat. 38. 14.

MONTREAL, or *Mount Royal*, a fortress of Germany, in the circle of the Lower Rhine, and electorate of Triers; seated on the river Moselle, 22 miles N. E. of Triers. E. Lon. 7. 6. N. Lat. 49. 59.

MONTROSE, a handsome town of North Britain, in the shire of Angus, situated at the mouth of the river Esk, on the German Ocean, 46 miles north-east of Edinburgh, but 70 miles distance by road. The houses are neat, and many of them in the modern taste. The most remarkable public buildings are, the town-house, the church, and an elegant episcopal chapel.—Montrose is a parliament town, and a dukedom in the family of Graham. It stands between two rivers, the south and north Esks, over which there have been lately built two very handsome bridges, at a great expence. The salmon fisheries on these rivers are very valuable, and form a good branch of commerce.

Montreal,
Montrose.

Montrose, merce. The harbour is a fine semicircular basin defended by a handsome stone pier. A great number of trading vessels belong to this port.

MONTROSE (Marquis of). See GRAHAM; and BRITAIN, n^o 137, 138, 143, 265.

MONTSERRAT, a mountain of Spain, in Catalonia, one of the most singular in the world for situation, shape, and composition. It stands single, towering over a hilly country like a pile of grotto work or Gothic spires; and its height so great, that to a beholder on the top the neighbouring mountains appear to be sunk to a level with the plain. It is composed of steep rocks, which at a distance seem indented; whence it is said to have received the name *Montserrat* from the Latin word *ferra* a "saw." It is impossible to describe the beauty, richness, and variety, of the landscapes discovered from the most elevated point: but the extensiveness of the prospect may be conceived by the reader, upon being told that the islands of Minorca and Majorca, which are at the distance of 60 leagues, are discovered from this elevation.

Montserrat is particularly famous for the adoration that is paid to an image of the Virgin, which, according to tradition, was found in a cave in this mountain by some shepherds in the year 880. Over this image, Guthred earl of Barcelona caused a monastery and chapel to be erected; but, after remaining in this receptacle upwards of 700 years, Philip II. and Philip III. built a magnificent church for its reception. Innumerable and astonishing miracles are ascribed to this holy image. The convent or monastery is situated in a nook of the mountain; it seems as if vast torrents of water, or some violent convulsion of nature, had split the eastern face of Montserrat, and formed in the cleft a sufficient platform to build the monastery upon. The river Llobregat roars at the bottom, and perpendicular walls of rock, of prodigious height, rise from the water edge near half way up the mountain. Upon these masses of white stone rests the small piece of level ground which the monks inhabit. Close behind the abbey, and in some parts impending over it, huge cliffs shoot up in a semicircle to a stupendous elevation: their summits are split into sharp cones, pillars, pipes, and other odd shapes, blanched and bare; but the interstices are filled up with forests of evergreen and deciduous trees and plants. Fifteen hermitages are placed among the woods; nay, some of them on the very pinnacles of the rocks, and in cavities hewn out of the loftiest of these pyramids.

The monastery is one of the 45 religious houses of the Spanish congregation of the order of St Benedict; their general chapter is held every fourth year at Valladolid, where the deputies choose abbots and other dignitaries for the ensuing quadrennium. In this monastery, they elect for abbot a Catalan and a Castilian alternately. Their possessions are great, consisting of nine villages lying to the south of the mountain; but the king has lately curtailed their income about 6000 livres a year, by appropriating to his own use the best house in each village, some of which, with their tythes, are worth 200 dollars per annum. Their original foundation, in 866, gave them nothing but the mountain; and to donations and economy they owe

the great increase of their landed property. They are bound to feed and harbour for three days all poor pilgrims that come up to pay their homage to the Virgin; and the allowance is a luncheon of bread in the morning, as much more, with broth, at noon, and bread again at night. Sometimes, on particular festivals, 7000 persons arrive in one day; but people of condition pay a reasonable price for what they eat.—The number of professed monks, according to Mr Swinburne, is 76 (according to M. Bourgoanne 60); of lay-brothers, 28; and of singing boys, 25; besides physician, surgeon, and servants. The church is a gloomy edifice; and the gilding is much sullied with the smoke of 85 lamps of silver, of various forms and sizes, that hang round the cornice of the sanctuary. Funds have been bequeathed by different devotees for furnishing them with oil. The choir above stairs is decorated with the life of Christ, in good wooden carving. A gallery runs on each side of the chancel, for the convenience of the monks. A large iron grate divides the church from the chapel of the Virgin, where the image stands in a nich over the altar, before which burn four tapers in large silver candlesticks, the present of the duke of Medina Celi. In the sacristy, and passages leading to it, are presses and cupboards full of relics and ornaments of gold, silver, and precious stones; they point out, as the most remarkable, two crowns for the Virgin and her son, of inestimable value; some large diamond rings; an excellent cameo of Medusa's head; the Roman emperors in alabaster; and the sword of St Ignatius. But as no offerings to this miraculous statue can be rejected or otherwise disposed of, the shelves are crowded with most whimsical *ex votos*, viz. silver legs, fingers, breasts, ear rings, watches, two-wheeled chaises, boats, carts, and such like trumpery.

On different parts of the mountain, as already noticed, are a number of hermitages. Each of these solitary retreats, which at a distance seem destitute of every thing, has a chapel, a cell, a well in the rock, and a little garden. The inhabitant of one of them, which is dedicated to St Beneto, has the privilege of making an annual entertainment on a certain day; on which day all the other hermits are invited, when they receive the sacrament from the hands of the mountain vicar, and after divine service dine together. They meet also at this hermitage, on the days of the saints to which their several hermitages are dedicated, to say mass, and commune with each other. But at other times they live in a very solitary and recluse manner, perform various penances, and adhere to very rigid rules of abstinence; nor do they ever eat flesh; nor are they allowed to keep within their walls either dog, cat, bird, or any living thing, lest their attention should be withdrawn from heavenly to earthly affections. Most of these hermits are said to be persons of fortune and family, disgusted with the world, who have retired thither to devote themselves to meditation, self-denial, and contrition.

MONTSERRAT, one of the Caribbee Isles belonging to Great Britain. It is a very small, but very pleasant island, so called by Columbus from its resemblance to the famous mountain near Barcelona in Catalonia. It lies in W. Long. 61. 0. N. Lat. 16. 50. having Antigua to the north-east, St Christopher's and Nevis

Montserrat.

Montserrat to the north-west, and Gaudaloupe lying south south-east at the distance of about nine leagues. In its figure it is nearly round, about nine miles in extent every way, 27 in circumference, and is supposed to contain about 40,000 or 50,000 acres. The climate is warm, but less so than in Antigua, and is esteemed very healthy. The soil is mountainous, but with pleasant valleys, rich and fertile, between them; the hills are covered with cedars and other fine trees. Here are all the animals as well as vegetables and fruits that are to be found in the other islands, and not at all inferior to them in quality. The inhabitants raised formerly a considerable quantity of indigo, which was none of the best, but which they cut four times a-year. The present product is cotton, rum, and sugar. There is no good harbour, but three tolerable roads, at Plymouth, Old Harbour, and Ker's bay, where they ship the produce of the island. Public affairs are administered here as in the other isles, by a lieutenant-governor, council, and assembly, composed of no more than eight members, two from each of the four districts into which it is divided. The wonderful effects of industry and experience in meliorating the gifts of nature have been no where more conspicuous than in these islands, and particularly in this, by gradually improving their produce, more especially of late years, since the art of planting hath been reduced to a regular system, and almost all the defects of soil so thoroughly removed by proper management and manure, that, except from the failure of seasons, or the want of hands, there is seldom any fear of a crop. In 1770 there were exported from this island to Great Britain 167 bags of cotton, 1670 l.; 740 hogheads of rum, 7400 l. To Ireland 133 ditto, 1330 l.; 4338 hogheads 232 tierces 202 barrels of sugar, 79,507 l.; in the whole 89,907 l. To North America 12,633 l. There are a few ships employed in trading to this island from London and from Bristol. As to the number of inhabitants, according to the most probable accounts, they consist of between 1200 and 1500 whites, and from 10,000 to 12,000 negroes, tho' some say not so many.

MONUMENT, in architecture, a building destined to preserve the memory, &c. of the person who raised it, or the person for whom it was raised; such are a mausoleum, a triumphal arch, a pyramid, &c.

MOOD, or **MODE**. See **MODE**.

Moons of Syllogism. See **Logic** n° 85.

MOON, or *Mode*, in grammar, the different manner of conjugating verbs. See **GRAMMAR**.

MOON, (*Luna*, ♀), in astronomy, one of the heavenly bodies, usually ranked among the planets; but with more propriety accounted a satellite, or secondary planet.

Among the ancients, the moon was an object of prime regard. — By the *Hebrews* she was more regarded than the sun, and they were more inclined to worship her as a deity. The new moons, or first days of every month, were kept as festivals among them, which were celebrated with sound of trumpets, entertainments, and sacrifice. (See **Numb.** xxviii. 11. x. 16. 1 **Sam.** xx. 5—18.) People were not obliged on these days to rest. The feasts of new moons were a miniature representation of the feast of trumpets, which was held on the first of the month *Tifri*, which was the beginning

of the civil year. The Jews not being acquainted with the physical cause of eclipses, looked upon them, whether of sun or moon, as signs of the divine displeasure. The Grecians looked upon the moon as favourable to marriage; and the full moons or the times of conjunction of sun and moon, were held the most lucky seasons for celebrating marriages; because they imagined the moon to have great influence over generation. The full moon was held favourable for any undertakings by the Spartans: And no motive could induce them to enter upon an expedition, march an army, or attack an enemy, till the full of the moon. The moon was supposed both by Greeks and Romans to preside over child-birth. — The patricians at Rome wore a crescent on their shoes, to distinguish them from the other orders of men. This crescent was called *Lunula*. Some say it was of ivory, others that it was worked upon the shoe, and others that it was only a particular kind of fibula or buckle.

As all the other planets move primarily round the sun, so does the moon round the earth: her orbit is an ellipsis, in which she is retained by the force of gravity; performing her revolution round the earth, from change to change, in 29 days, 12 hours, and 44 minutes, and round the sun with it every year: she goes round her orbit in 27 days, 7 hours, 43 minutes, moving about 2190 miles every hour; and turns round her axis exactly in the time that she goes round the earth, which is the reason of her keeping always the same side towards us; and that her day and night taken together are as long as our lunar month.

The mean distance of the moon from the earth is $60\frac{1}{2}$ semi-diameters of the earth; which is equivalent to 240,000 miles. The mean eccentricity of her orbit is $\frac{1}{8000}$ of her mean distance, or in miles 13,000, which makes a considerable variation in that mean distance. — Her diameter is to that of the earth as 100 to 365, as 11 to 40.15, or 2180 miles: its mean apparent diameter is 31 minutes $16\frac{1}{2}$, and that of the sun 32 minutes.12 seconds. Its mean diameter, as seen from the sun, is 6 seconds.

The moon's surface contains 14,898,750 square miles, and its solidity 5,408,246,000 cubical ones. The density of the moon's body is to that of the earth as 48,911 to 39,214; to that of the sun, as 48,911 to 10,000; its quantity of matter to that of the earth, nearly as 1 to 39.15; the force of gravity on its surface is to that on the surface of the earth as 139.2 to 407.8; and the moon's bulk to that of the earth as $\frac{1}{30}$ to 1. The moon has scarce any difference of seasons; because her axis is almost perpendicular to the ecliptic.

The different appearances of the moon are very numerous; sometimes she is increasing, then waning; sometimes horned, then semicircular; sometimes gibbous, then full and round. Sometimes, again, she illumines us the whole night; sometimes only a part of it; sometimes she is found in the southern hemisphere, sometimes in the northern; all which variations having been first observed by Endymion, an ancient Grecian who watched her motions, she was fabled to have fallen in love with him. The source of most of these appearances is, that the moon is a dark, opaque, and spherical body, and only shines with the light she receives from the sun; whence only that half

Moon.

turned towards him, at any instant, can be illuminated, the opposite half remaining in its native darkness. The face of the moon visible on our earth, is that part of her body turned towards the earth; whence, according to the various positions of the moon, with regard to the sun and earth, we observe different degrees of illumination; sometimes a large and sometimes a less portion of the enlightened surface being visible. — But for a particular account of the nature, phenomena, &c. of this secondary but interesting planet, see *ASTRONOMY-Index*, at *Moon*.

* See *ASTRONOMY-Index*, at *Moon*.

New Observations on the Atmosphere, Twilight, &c. of the Moon. M. Schroeter of the Royal Society of Gottingen has lately published a very curious and elaborate work in German, intitled *Selenotopographische Fragmente*, &c. or Selenotopographical Fragments, intended to promote a more accurate knowledge of the Moon's surface. The several maps of the moon*, which have been delineated by Hevelius, Ricciolus, Cassini, and Mayer, are well known to every person conversant with astronomical subjects. It is evident that these delineations can give only a very general idea of the spots, together with their relative position on the lunar disk; and as, with respect to us, the appearance of these must vary according to the direction in which the rays of the sun fall on them, the moon's surface will not exactly correspond with the representation of it laid down in the map, except when it happens to be illuminated under the same angle as when this map was drawn. This consideration induced the author to apply himself to the invention of a more accurate mode of describing these phenomena than had hitherto been attempted. For this purpose, having provided himself with a telescope seven feet in length, constructed by Dr Herschel, he resolved, repeatedly, and under various angles of illumination, to observe and delineate very small portions of the lunar disk; in order that, by comparing his different drawings of the same objects, he might compile an accurate topographical description of the moon's surface: but, in this manner, to form a complete lunar atlas, was an undertaking too extensive for a single person. He therefore found himself obliged to prescribe more narrow limits to his design, and confined his plan to the delineation of the several portions of the moon's surface under one angle only of illumination, and this a very small one, that he might obtain more distinct and accurate observations and drawings of the shadows; intending at the same time to examine such parts as appeared either more remarkable or less distinct than the rest, by repeated observations under various angles of illumination: And the present volume contains the result of his observations, with respect to the northern parts of the lunar disk.

The author observes, that, through a telescope which magnifies a thousand times, a lunar object of 190 feet in surface appears like a very small point; and that, to be distinguishable with respect to shape, it must not be less than 800 feet in extent. He tells us, that for his observations he preferred those times when the sun's rays fell on the moon under the least angle; that he carefully and repeatedly examined every object that could be distinguished, and either actually measured its apparent diameter and the length of its shadow, or compared these dimensions with others which he had

already measured; and that he never used magnifiers of greater power than what was absolutely necessary to render the object distinct. In order to facilitate the delineation, he applied to his telescope a projecting micrometer, divided into small squares, which, by means of a brass rod, could be placed at any distance from the eye, and always be kept parallel to the line of the moon's horns. His maps or drawings are orthographical projections; and his scale is so constructed, that 20 seconds of the moon's disk correspond with half an English inch on the map; thus the space of 4 seconds is represented in the compass of a decimal line, and, according to M. Schroeter's computation, answers to a German mile or 3807 toises. The inconveniences and inaccuracy of the common method of measuring the lunar mountains, induced him to contrive others capable of greater exactness and more general application: these he varied as the circumstances of the case required; but they are all trigonometrical calculations of the height of the mountain, or the depth of the cavity from the angle of illumination and from the length of the shadow.

If, as some have supposed, a great part of the moon's surface be volcanic, it is natural to expect that the marks of eruptions should from time to time be discernible. A single instance of this kind occurred to our author: ever since the 27th of August 1788, he had constantly seen a cavity, or, as he terms it, a *volcanic crater*, in the spot Hevelius, which he had never before perceived, though he had often examined this part of the moon with the utmost attention, and in the most favourable circumstances. According to his conjectures, this phenomenon must have commenced between the 24th of October 1787 and the 27th of August 1788.

He observed some alterations in the appearance of lunar objects, which, though too considerable to be attributed to the variation of light, were not sufficiently permanent to be considered as the effect of volcanoes. These he ascribes to meteors; for though he does not suppose the moon to be surrounded with air, exactly like that which invests our globe, he thinks it probable that it may have an atmosphere of some kind, in which some of the elements of bodies, decomposed on its surface, may be suspended; and that some of the lunar mountains may emit nebulous vapours, not unlike the smoke of our volcanoes, which obscure and disguise the objects seen through them.

In regard to those bright points, which have been seen on the moon's surface during eclipses, and at other times on her unenlightened part, and which some have supposed to be burning volcanoes; Schroeter, after the most attentive examination of them, imagines that most of them must be ascribed to the light reflected from the earth to the dark part of the moon's disk, which returns it from the tops of its mountains, under various angles, and with different degrees of brightness. Some of these phenomena he suspects to be no more than optical illusions, arising from igneous meteors floating in our atmosphere, which happen to fall within the field of the telescope.

But the most interesting part of this work consists of the author's "Remarks on the Formation and physical Constitution of the Moon's Surface and Atmosphere."

Moon.

The

Moon.

The surface of the moon appears to be much more unequal than that of our earth; and these inequalities have great variety both in form and magnitude. There are large irregular plains, on which are observed long and narrow strata of hills running in a serpentine direction: some of the mountains form extensive chains; others, which are in general the highest, stand alone, and are of a conical shape: some have craters; others form a circular ring inclosing a plain; and in the centre of many of these plains, as well as in the middle of some of the craters, other mountains are found, which have likewise their craters. These mountains are various with respect to colour, some being much darker than others.

The most lofty mountain on the surface of our globe is supposed to be Chimboraco, which is not 20,000 feet in height: but there are many in the moon which are much higher; that which is distinguished by the name of *Leibnitz*, is not less than 25,000 feet. This elevation will appear more extraordinary, if compared with the moon's diameter, of which it is $\frac{1}{14}$ th; whereas Chimboraco is not above $\frac{1}{1017}$ th of that of the earth: thus considered, the lunar mountains are near five times as high as any on our globe.

The craters of the moon are circular, and surrounded with an annular bank of hills: they are remarkable for their width, many of them being from 4 to 15 geographical miles in diameter: some are not deeper than the level of the moon's surface; others are 9000, 12,000, and 15,000 feet in depth: that of one, which our author calls *Bernouilli*, is above 18,000 feet. The height of the annular bank is seldom equal to the depth of the crater which it surrounds; but the quantity of matter in the one appears to be in general nearly equal to the capacity of the other. The principal mountains and cavities seem to be connected by a series of others of less magnitude; and sometimes by hilly strata, which, like the radii of a circle, may be traced to a common centre; this is generally either a mountain or crater, though not of the greatest height or depth. These hilly strata, which, through smaller telescopes, appear like veins on the moon's surface, have often been mistaken for torrents of lava; none of which, M. Schroeter says, he could ever discover.

From all the preceding circumstances, the author concludes, that whatever may have been the cause of the inequalities of the moon's surface, it must not only have operated with great violence, but also have met with great resistance; which inclines him to think, that the substance of this planet must originally have been very hard and refractory. He is of opinion that these mountains and cavities must have been produced in consequence of some great revolution occasioned by the action of a force directed from the centre towards the surface, and in this respect similar to that which gave birth to our volcanoes: but he observes, that we have no reason to suppose it absolutely volcanic, nor that it originated from fire. In some places, this force has only elevated the surface, and thus formed hills and mountains; in others, the ground has yielded to its violence, and has either been thrown up as a bank round the crater thus formed, or else falling into other cavities, has in part filled them up; after having exerted its greatest violence in these mountainous accumulations, it has diffused itself in various directions,

N° 227.

and produced the hilly strata which are observed to diverge from them, like the radii of a circle from the centre. In support of this hypothesis, it is alleged, that the largest craters have the least depth, and that in the deepest there is the most equal proportion between the capacity of the crater and the volume of the annular bank around it: but beside the grand revolution here supposed, M. Schroeter is of opinion that there have been others of later date and less extent; to these he ascribes the formation of secondary mountains, which arise either from the middle of the craters of the primary, or from the centre of a plain surrounded by a circle of hills; many of these have also craters, and, like the primary mountains, are connected by a series of cavities and hilly strata, that mark the progress of the cause by which they were produced. The new crater discovered by our author in the spot Hevelius, together with other circumstances here enumerated, seem to indicate that the surface of the moon is far from being permanently settled and quiescent.

The author's observations confirm the opinion that the cavities visible on the lunar surface do not contain water: hence he concludes, that there can be no extensive seas and oceans, like those which cover a great part of the earth; but he allows that there may be springs and small rivers. The question, whether the moon be inhabited? is not omitted by M. Schroeter, who observes, that though it be not adapted to beings organised as we are, this is no proof that it may not be peopled with intelligent agents, endued with bodily constitutions suitable to the nature and economy of the planet for which they are destined.

With regard to a lunar atmosphere, the existence of which has been a subject of much dispute*, our author adduces a variety of proofs in support of the affirmative side of the question. He also makes a number of observations on several of its relative properties, compared with the same in our atmosphere; such as its greater dryness, rarity, and clearness, which, however, do not prevent its refracting the solar rays, having pointed out the circumstance, that the mountains in the dark hemisphere of the moon, near its luminous border, which are of sufficient height to receive the light of the sun, are the more feebly illuminated the more distant they are from that border: from which proofs of a refracting atmosphere, he also deduced the probability of the existence of a faint twilight, though his long series of observations had not yet fully evinced it—He had, however, ascertained the existence of a twilight on Venus; and as one fortunate discovery often leads to another, he had no sooner succeeded in his observations on that planet, than he was induced to direct his attention, for a similar purpose, to the moon. In doing this, he applied the calculations and inferences he there made to some appearances he had already noticed on this satellite. It occurred to him, that if in fact there were a twilight on the moon, as there is on Venus and our earth, it could not, considering the greater rarity of its atmosphere, be so considerable: that the vestiges of it, allowing for the brightness of the luminous part of the moon, the strong light that is thence thrown upon the field of the telescope, and in some measure the reflected light of our earth, could only be traced on the limb, particularly

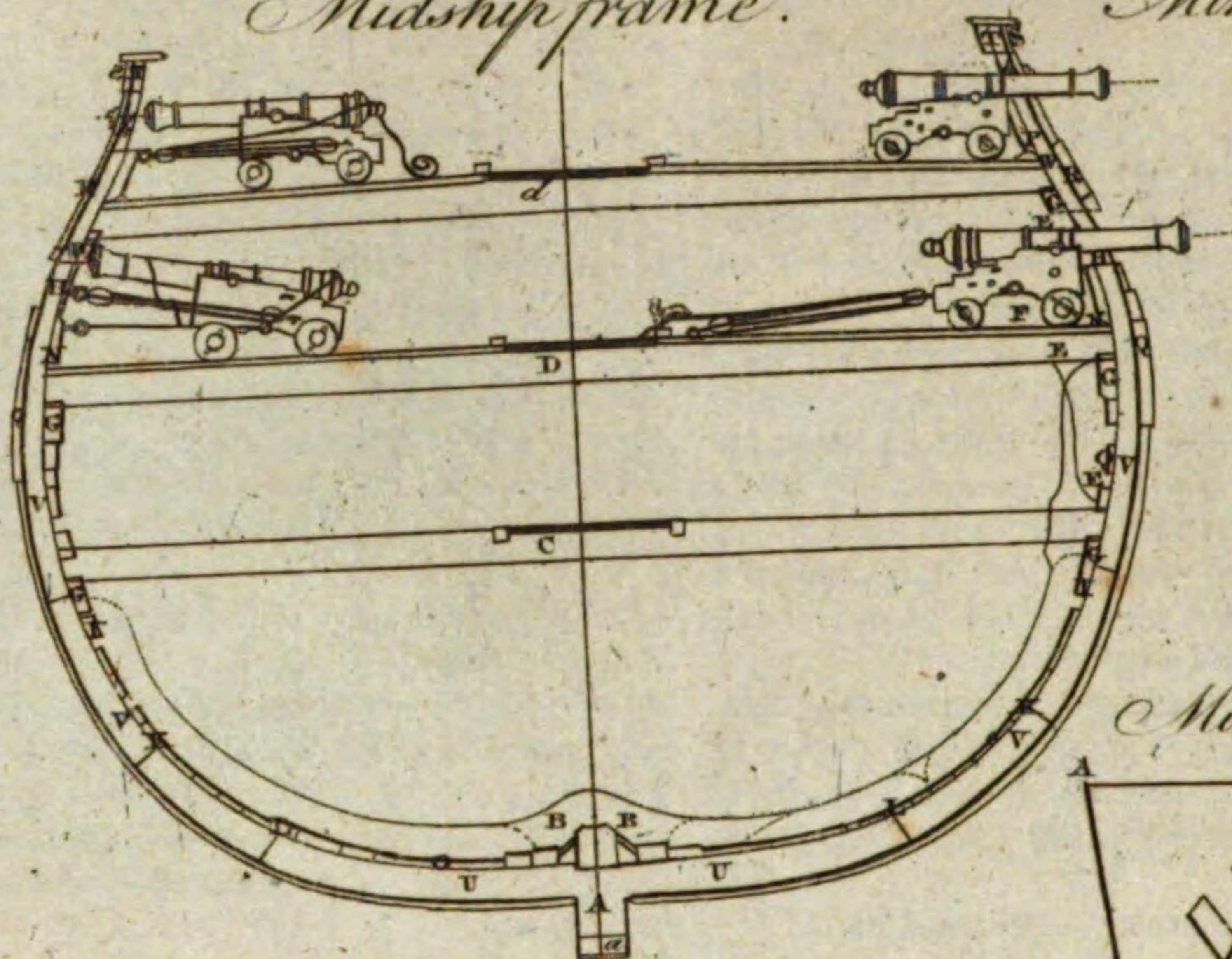
Moon.

* See ASTRONOMY-Index, at Moon.

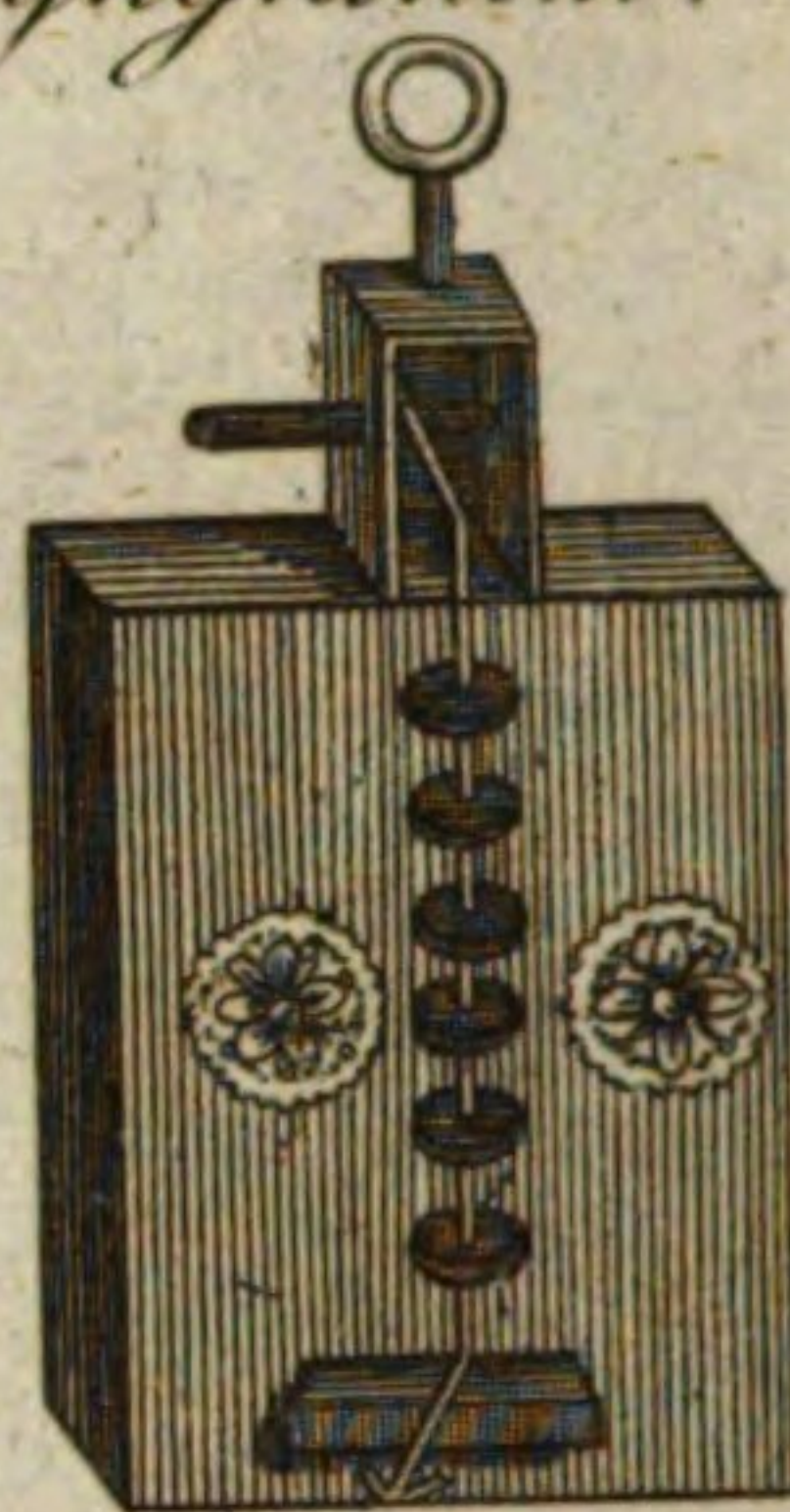
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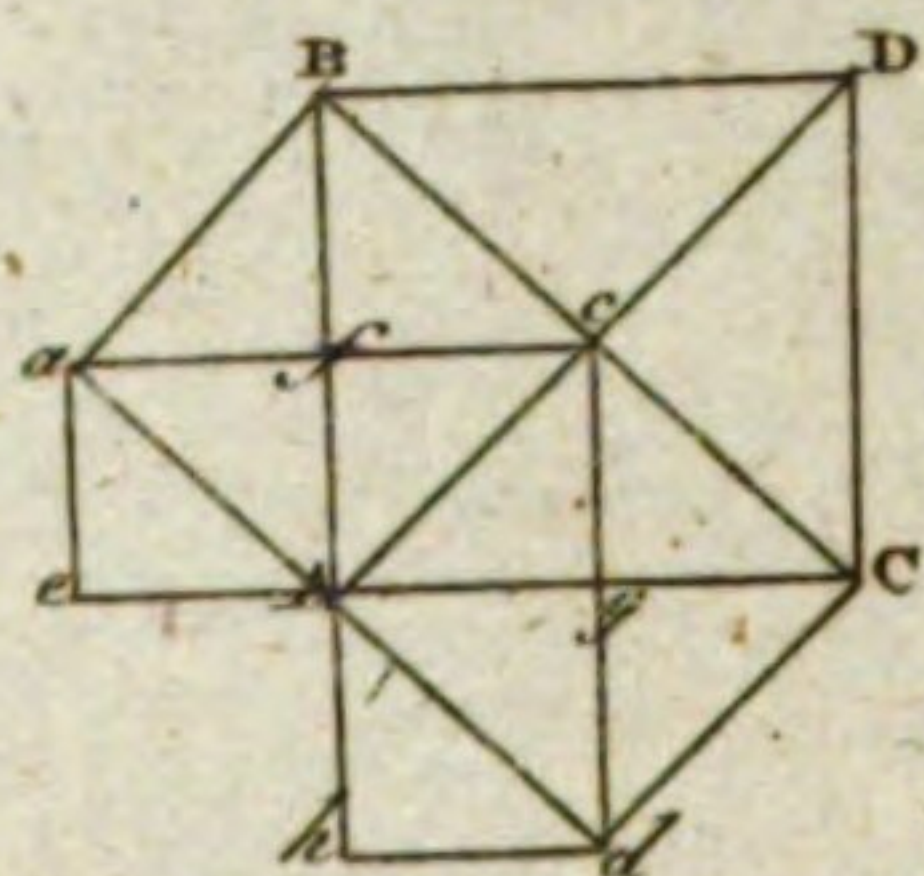
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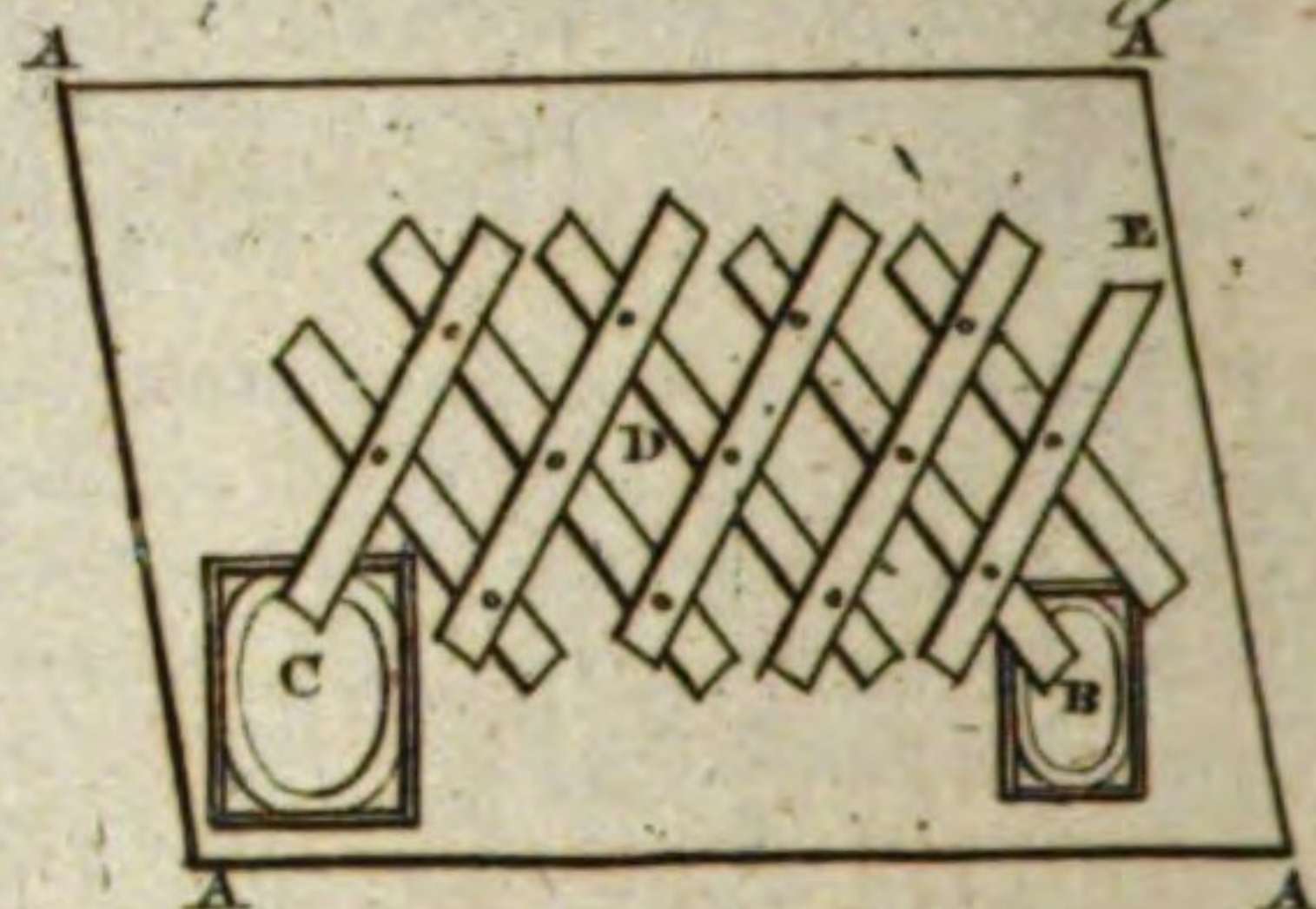
Minagunghinim.



Motion.



Miniature Painting.



Moon.
Fig. 1.



Fig. 2.



Fig. 3.

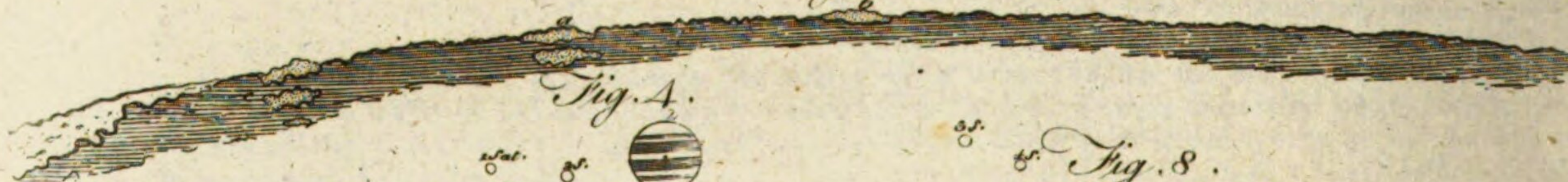


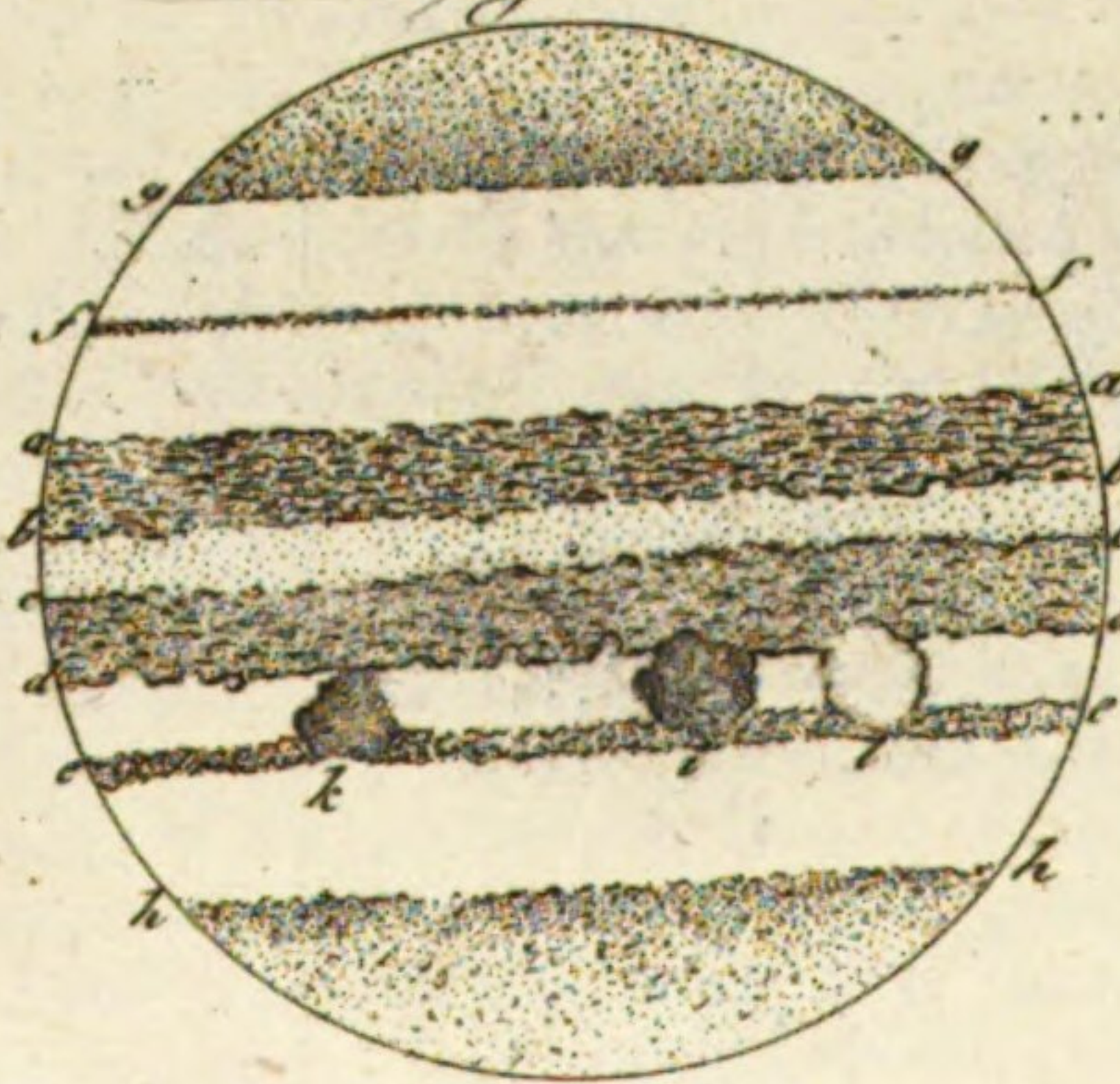
Fig. 4.



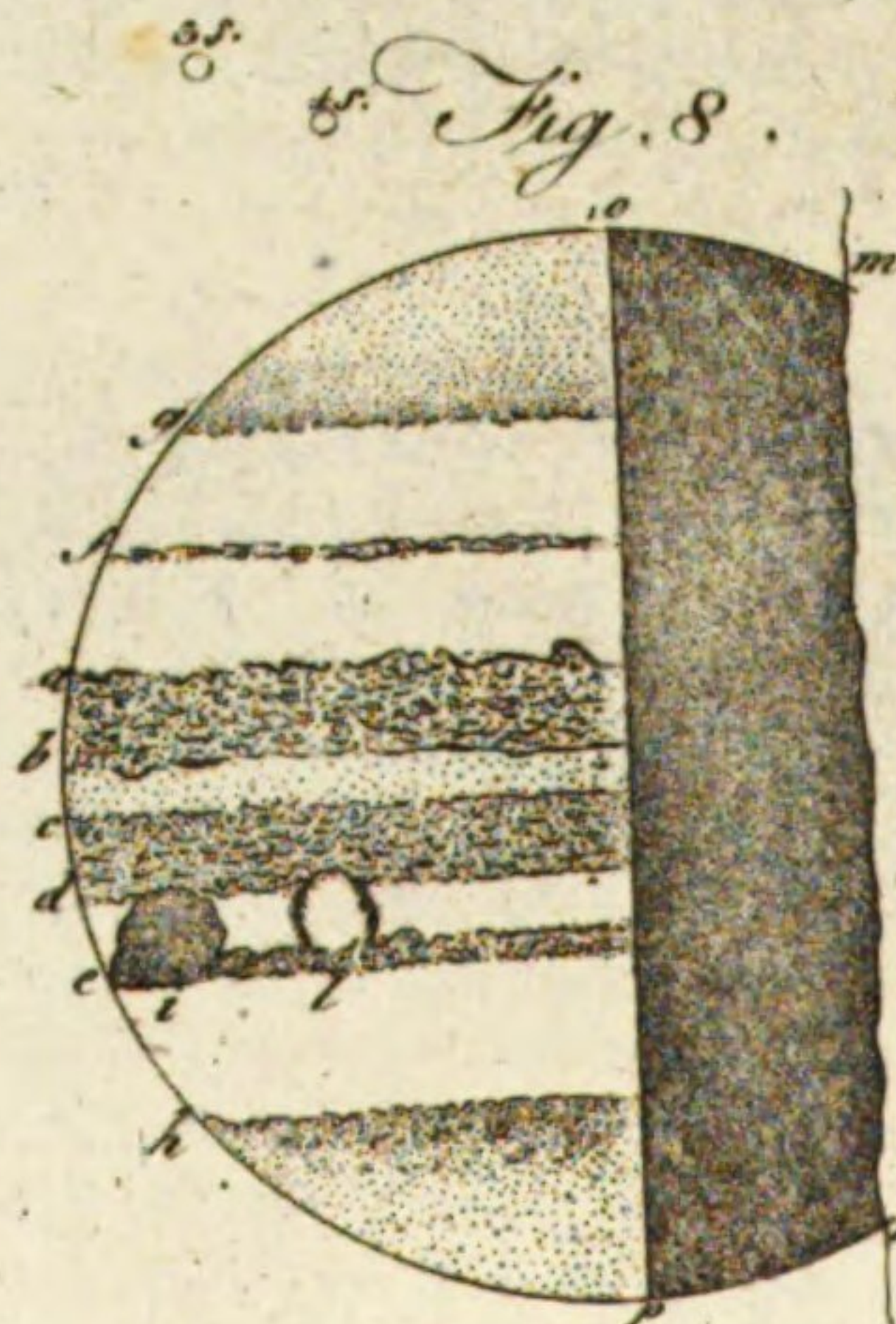
Fig. 5.

Fig. 6.

Aristarchus.



North



North

Fig. 7.



Plutarch.
Seneca.

1. Bell Pinnat's Sculpt. post.

Moon.

cularly at the cusps; and even this only at the time when our own twilight is not strong, but the air very clear, and when the moon, in one of its least phases, is in a high altitude, either in the spring, following the sun two days after a new moon; or in the autumn, preceding the sun in the morning, with the same aspect: in a word, that the projection of this twilight will be the greater and more perceptible the more fal-cated the phase, and the higher the moon above the horizon, and out of our own twilight.

All the requisite circumstances do not often coincide. M. Schroeter, however, was so fortunate as to be favoured with a combination of them on the 24th of February 1792: And the observation proved in every respect so complete, and the inferences deducible from it appeared to him so new and interesting, that he could not with-hold the immediate communication of it from the public. His observations concerning both the Moon and Venus have been accordingly detailed in a paper sent to the Royal Society of London, and inserted in their Transactions for 1792; from which the following respecting the Moon are extracted.

"On the above mentioned evening, at 5^h 40', two days and 12 hours after the new moon, when in consequence of the libration the western border of the grey surface of the Mare Crisium was 1' 20" distant from the western limb of the moon, the air being perfectly clear, I prepared my seven-feet reflector, magnifying 74 times, in order to observe the first clearing up of the dark hemisphere, which was illuminated only by the light of our earth, and more especially to ascertain whether in fact this hemisphere, which, as is well known, is always somewhat more luminous at the limb than in the middle, would emerge out of our twilight at many parts at once, or first only at the two cusps. Both these points appeared now, most distinctly and decidedly, tapering in a very sharp, faint, scarce any where interrupted, prolongation; each of them exhibiting, with the greatest precision, its farthest extremity faintly illuminated by the solar rays, before any part of the dark hemisphere could be distinguished. But this dark hemisphere began soon after to clear up at once at its border, though immediately only at the cusps, where, but more particularly at their points, this border displayed, on both at the same time, a luminous margin, above a minute in breadth, of a very pale grey light, which, compared with that of the farthest extremities of the cusps themselves, was of a very different colour, and relatively as faint as the twilight I discovered on the dark hemisphere of Venus, and that of our own earth, when compared with the light immediately derived from the sun. This light, however, faded away so gradually towards the east, as to render the border on that side perfectly undefined, the termination losing itself imperceptibly in the colour of the sky.

"I examined this light with all possible care, and found it of the same extent at both points, and fading away at both in the same gradual proportion. But I also, with the same caution, explored whether I could distinguish any part of the limb of the moon farther towards the east; since, if this crepuscular light had been the effect of the light reflected from our globe, it would undoubtedly have appeared more sensibly at

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the parts most remote from the glare of the illuminated hemisphere. But, with the greatest exertion of my visual powers, I could not discover any part of the, as yet, wholly darkened hemisphere, except one single speck, being the summit of the mountainous ridge Leibnitz, which was then strongly illuminated by the solar light: and indeed eight minutes elapsed before the remainder of the limb became visible; when not only separate parts of it, but the whole, displayed itself at once.

"This alone gave me certain hopes of an ample recompence, and satisfied me that the principles I had laid down in my Selenotop. Fragm. § 525. *et seq.* concerning the atmospheres of the planets, and especially of the moon, are founded on truth. But a similar observation made on the 6th, after seven o'clock, afforded me several collateral circumstances, which strongly corroborate what I have there advanced on this subject. The whole limb of the dark hemisphere, illuminated only by the reflected light of our globe, appeared now so clear and distinct, that I could very readily discern not only the large but also the smaller spots, and among these Plato, Aristarchus, Menelaus, Manilius, Copernicus, &c. and even the small speck to the north-west of Aristarchus, marked *b*, Tab. XXVII. fig. 1. of the Fragments. I could apply the usual power, magnifying 161 times; and had full leisure, and the means, to examine every thing carefully and repeatedly, and to take very accurate measurements.

"Although a just idea of so delicate a phenomenon as this crepuscular light cannot possibly be conveyed by a drawing, but must be gathered from actual inspection, I have, nevertheless, attempted a delineation of it, and of the southern and eastern cusps, fig. 1. and 2. as deduced from my measurements, especially at the southern cusp, in hopes thereby to render what I have farther to say concerning this observation the more intelligible.

"The southern cusp (fig. 1.) extended from *a* to *c*, with a gradually fading but still resplendent solar light, of its usual pale yellow colour, and terminated at *c* with a mountain. That this was really the point of the cusp, appears not only from the general construction of the falcated segment, which was sufficiently narrow even at its beginning *a*, near which it was somewhat disfigured at *b* by a high mountain, but also from the narrowness of its luminous curve at *d* and *f*, the breadth of which seldom exceeded 1", and had a sensible interruption so near as *d*. This curve was throughout, from *a* to *c*, except where the glare of the solar rays spread some degree of light, bordered with the pale ash-colour of the dark hemisphere, glimmering with the faint light reflected from our earth; out of which, however, rose the higher mountains *g*, *h*, *i*, *c*, which were now already illuminated by the sun; and farther on, not less than 30 lines, or, according to my usual projection, two minutes distant from the point *c*, was seen another mountain *l*, which belonged to the high ridge Leibnitz, and also received its light immediately from the sun.

"There can hence be no doubt of the termination of the cusp being at *c*; and this being well ascertained, I now distinguished with the greatest certainty the twilight extending from *c* to *k*. The most remarkable circumstances attending this light were, that it

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was broadest and brightest at *c*, and that it dwindled away and contracted towards *k*, where it lost itself in the faint glimmering of our terrestrial light; and that at the northern cusp (fig. 2.), at which there do not appear to be so many mountains and inequalities as at the southern, this light exhibited the same pyramidal form, and was of equal length, and alike fading in intensity and colour, as that at the southern.

"This light, compared with that of the thinnest and least bright part of the cusp *dc*, was as faint as the pale ash-coloured spots in the luminous hemisphere, when opposed to the bright ones. But this is still better illustrated by a comparison between the high mountain *l* (fig. 1.) which now already appeared illuminated by the solar light and the spot Aristarchus, which shone moderately merely with the light reflected from our globe. The said mountain had, comparatively with the thin luminous arc *def* of the bright hemisphere, and the mountains *g, b, i, c*, a very pale, fading, but yet brighter light than Aristarchus, as indeed might have been expected from what I said in my Selenotop. Fragm.; but this reflected light upon Aristarchus was, however, sensibly brighter than the glimmering light from *c* to *k*. And, respecting the still fainter terrestrial light which bordered the luminous curve from *c* to *k* (fig. 1. and 2.), I cannot give a better idea of it than by observing, that the light at the extremities of both the cusps appeared of a pyramidal form, similar to, but though gradually fading, and very undefined, yet brighter than that of our zodiacal light, when, in the months of March and April, it blends itself, comparatively with the remaining colour of the sky, with the terrestrial light, terminating in a very sharp point.

"The undefined and gradually fading appearance of this light was the cause that, though I had recourse to a dark projection table, I could not, however, take any accurate measurements of it. I found nevertheless, by repeated comparisons, that the length of this pyramidal glimmering light, in which I could perceive no sensible inequality at the limb of the moon, amounted to about $\frac{2}{3}$ of the distance between the two mountains *c, l*, (fig. 1.) which shone with the solar light. Comparing also this southern twilight with the northern, it appeared of the same length; and, on measuring the distance *cl*, I found it repeatedly = 30 lines = 2'; so that the length of the twilight must have amounted to 20 lines = 1' 20". Its greatest breadth at *c* could, on the other hand, because of the extent and greater density of its light, be easily ascertained by means of the immediate application of the projection table. This measurement gave at most $\frac{2}{3}$ of a line, or full 2".

"Although I be positively certain of this very remarkable appearance at both cusps, and of its perfect similarity, in all my observations, I could not, however, trace any vestige of a like crepuscular light at any other part of the terminating border; nor could I on the very next evening, being the 25th, and also on the 26th of February, perceive, even at the cusps, any of the twilight I expected to see there; the very thin, faint, luminous line, which did indeed appear on the 26th, at the southern cusp between *a* and *b*, (fig. 3.), being undoubtedly the effect of the immediate solar light, probably illuminating some pro-

minent, flat area, as yet situated in the dark hemisphere.

"Thus far the observations: and now for the application of them."

"I need hardly insist upon the proofs, that the very faint pyramidal glimmering light, observed on the 24th of February at the extremities of both cusps, could by no means be the immediate effect of the solar light, all the circumstances of the observations militating uniformly and decidedly against this supposition, which, were it true, would oblige us to admit a most unaccountable diminution of light, and thence also a density of the lunar atmosphere, that ought to exceed even the density of ours; a fact absolutely contradicted by all the lunar observations hitherto made. This light, indeed, was so very faint, that it disappeared at 7^h 20', when the moon approached the horizon; whilst, on the other hand, Aristarchus, which had no light but what it received from the earth, was still very distinguishable; and the summit of Leibnitz *l*, fig. 1. (which, though far within the dark hemisphere, was, however, illuminated by the immediate solar rays) displayed a degree of brightness, which, although when compared with that of the cusp *def*, it appeared very faint and dwindling, equalled, however, that of our Peak of Teneriffe. Nor can it be conceived why this glimmering light broke off so suddenly at both the cusps, without a progressive diminution. It can hardly be supposed, that similar, grey, prominent, flat areas, of the same form and dimensions, and comparatively of a faint light, which, whilst in the dark hemisphere, they derive immediately from the sun, exist on all parts of the moon; more especially as, at the places observed, the limb happened to exhibit throughout an exact spherical form, without the least sensible inequality; and as in both the bordering regions of the northern and southern hemispheres, especially in the latter, no such grey prominent planes are any where discernible. It may then be asked, why did this faint glimmering light appear at both cusps, along equal arcs of the limb, of equal length and breadth, and of the same pyramidal form? and why did its farther extremity blend itself with the terrestrial light of the dark hemisphere, which, according to a great number of my selenotopographic observations, is by no means the case, even with those grey prominent areas, which, being at some distance on the dark side of the terminating border, are nevertheless illuminated immediately by the sun?

"These, therefore, could certainly not derive their light immediately from the sun; whence this appearance, like the similar ones on the planet Venus, can only be ascribed to the solar rays reflected by the atmosphere of the moon upon those planes, producing on them a very faint, gradually diminishing, glimmering light, which at last loses itself in the reflected terrestrial light, in the same manner as our twilight blends itself with the light of the moon. Every circumstance of the above observation seems to me to confirm this supposition; and hence the observation itself, which, though single, was however a most fortunate and complete one, must appear of no small degree of importance, since it not only confirms the observations and inferences on the long contested lunar

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atmosphere contained in my Selenotop. Fragm. but also furnishes us with many more lights concerning the atmosphere of planets in general than had been afforded us by all those observations collectively."

This, and the mathematical certainty that the phenomenon is in fact nothing but a real twilight in the lunar atmosphere, he farther evinces by a series of theoretical deductions and calculations, which do not admit of being here stated. Among other results, it appears, that the lower and more dense part of the lunar atmosphere, that part, namely, which has the power of reflecting this bright crepuscular light, is only 1356 Paris feet in height; and hence it will easily be explained how, according to the different librations of the moon, ridges of mountains, even of a moderate height, situated at or near the terminating border, may partially interrupt, or at times wholly prevent, this crepuscular light, either at one or the other cusp, and sometimes at both. "I cannot hence (says our author) but consider the discovery I here announce as a very fortunate one, both as it appears to me decisive, and as it may induce future observers to direct their attention to this phenomenon. Admitting the validity of this new observation, which I think cannot well be called in question, I proceed now to deduce from it the following inferences.

"1. It confirms, to a degree of evidence, all the selenotopographic observations I have been so successful as to make on the various and alternate changes of particular parts of the lunar atmosphere. If the inferior and more dense part of this atmosphere be in fact of sufficient density to reflect a twilight over a zone of the dark hemisphere $2^{\circ} 34'$, or $10\frac{1}{2}$ geographical miles in breadth, which shall in intensity exceed the light reflected upon its dark hemisphere by the almost wholly illuminated disk of our earth; and if, by an incidental computation, this dense part be found to measure 1356 feet in perpendicular height, it may, according to the strictest analogy, be asserted, that the upper, and gradually more rarified strata, must, at least, reach above the highest mountains in the moon. And this will appear the more evident, if we reflect, that notwithstanding the inferior degree of gravitation on the surface of the moon, which Newton has estimated at somewhat less than one-sixth of that on our earth, the lower part of its atmosphere is nevertheless of so considerable a density. This considerable density will, therefore, fully account for the diminution of light observed at the cusps, and on the high ridges Leibnitz and Doerfel, when illuminated in the dark hemisphere; as also for the several obscurations and returning serenity, the eruptions, and other changes, I have frequently observed in the lunar atmosphere. This observation also implies:

"2. That the atmosphere of the moon is, notwithstanding this considerable density, much rarer than that of our earth. And this indeed is sufficiently confirmed by all our other lunar observations. I think I may assert, with the greatest confidence, that the clearer part of our twilight, when the sun is 4° below our horizon, and when we can conveniently read and write by the light we receive from it, surpasses considerably in intensity the light which the almost wholly illuminated disk of our earth reflects upon the dark hemisphere of the moon $2\frac{1}{2}$ days before and after the

new moon. But should we even admit an equal degree of intensity, it will, however, appear from computation, that our inferior atmosphere, which reflects as strong a light over 4° as that of the moon does over $2^{\circ} 34'$ of their respective circumferences, must be at least eight times higher than that of the moon.

"3. The striking diminution of light I noticed in my twelve years observations on Venus, likewise indicates, that the atmosphere of that planet, which is in many respects similar to ours, is much denser than that of the moon; and this will be still farther corroborated, if we compare together the several measurements and computations made concerning the twilights of different planets. There is no doubt but that the faintest twilight of Venus, as seen either before or after the rising and setting of the sun across our twilight, is much brighter than that of the moon; and it appears, moreover, from computation, that the denser part of the atmosphere of Venus measures at least 15000 Paris feet in height, and spreads its twilight 67 geographical miles into the dark hemisphere, whilst the denser part of the lunar atmosphere, whose height does not exceed 1356 feet, produces a faint twilight not above $10\frac{1}{2}$ geographical miles in breadth. Thus, as my successful observations on the twilight of Venus led me to the discovery of that of the moon, so did these latter reciprocally confirm the former; and thus, whichever way we contemplate the subject, must we be struck with the coincidence that prevails throughout.

"4. But if the lunar atmosphere be comparatively so rare, it follows, that the inflection of light produced by it cannot be very considerable; and hence does the computation of M. du Séjour, according to which the inflection of the solar rays which touch the moon amounts to no more than $4\frac{1}{2}''$, receive an additional degree of authenticity*. Besides which,

"5. As the true extent of the brightest lunar twilight amounts to $2^{\circ} 34'$, the obliquity of the ecliptic in the moon only to $1^{\circ} 29'$; the inclination of the orbit of the moon, on the contrary, to $5^{\circ} 15'$, and its synodic period, during which it performs a revolution round its axis is $= 29^d 12^h$; it follows, that its brightest twilight, to where it loses itself in the light reflected by the almost fully illuminated disk of our earth, must, at least at its nodes, last $5^h 3'$, and that it will be still longer at other parts of the orbit, according to the situation of the nodes.

"6. And lastly, it being a well known fact† that the fixed stars, as they approach the moon, diminish in splendor at the most only a very few seconds before their occultations, it was natural for me, after the successful observations I had made on the twilight of the moon, to pay particular attention to this circumstance. On the 25th of February, at 6^h P. M. the sky being very clear, the limb of the dark part of the moon appeared uncommonly distinct; and only a few seconds of a degree from its edge was seen a telescopic star of about the 10th or 12th magnitude. I counted full 20" before its occultation, and $18\frac{1}{2}$ of these, without the least perceptible diminution of light. The star, however, began now gradually to fade, and after the remaining $1\frac{1}{2}''$, during which I observed it with all possible attention, it vanished in an instant. This observation agrees perfectly with the above computations.

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* De la
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† Selenot.
Fragm.
§ 531.

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putations. Although it be proved that the inferior dense part of the lunar atmosphere reflects a stronger light than that which the dark hemisphere receives from an almost fully illuminated disk of our earth; and although, considering the inferiority of gravitation on the surface of the moon, there be no doubt that this dense part, together with the superior gradually more rarified regions of its atmosphere, must extend far above its highest mountains; it is yet a fact, that the breadth of this observed twilight, to where it loses itself in our reflected terrestrial light, does not measure more than $2^{\circ} 34'$: it is therefore highly probable, that its greatest extent, in the most favourable phases near our new moon, can never exceed the double of the above arc, or $5^{\circ} 8'$; and hence we can only infer a perpendicular height of an atmosphere, capable of inflecting the solar rays, which at most measures 5376 feet: nor is it very likely that, unless accidental and hitherto unknown circumstances should occasionally condense different parts of this atmosphere, these upper strata should materially affect the distinctness of a star seen through it.

"But admitting the height of the atmosphere, which may affect the brightness of a fixed star, not to be less than 5376 feet, this will amount to an arc of only $0,94''$, or not quite one second; and as the moon describes an arc of $1''$ in $2''$ of time, it follows, that in general the fading of a star, which approaches to an occultation, cannot last quite $2''$ in time; that if the appulse be at a part of a limb of the moon where a ridge of mountains interferes, the gradual obscuration will last a shorter time; and that it may, under some circumstances of this nature, be even instantaneous."

To the foregoing observations, M. Schroeter subjoins the following account of an occultation of Jupiter by the moon when near its full, which occurred to him by mere accident on the 7th of April 1792.

"The sky being very serene, and Jupiter uncommonly bright, I prepared my seven-feet reflector, magnifying 74 times, in hopes that the strong light and distinctness it afforded would enable me to compare the appearances of this phenomenon with the results which I had deduced from my late observations on the height and density of the atmosphere of the moon.

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"Fig. 4. represents the situation of Jupiter's four satellites, as they appeared, most distinctly, two of them to the westward, the second about one, and the first near two of Jupiter's diameters distant from its limb; and the two others to the eastward, the third about seven and the fourth near eight of the same diameters, distant from the said limb.

"Fig. 5. shows Jupiter with its belts, and of a somewhat spheroidal form, as it now appeared to me, and as distinctly as I had ever seen it. The equatorial belt, from *a* to *d*, was very apparent. It consisted properly of two zones, *ab* and *cd*, of a brownish-grey colour, with a more luminous interval *bc* between them. At *e* and *f* were two comparatively well defined stripes, which I had noticed for many years back, but which now crossed the whole disk; and the polar regions appeared again, from *g* and *h*, more dim and grey than the bright part of the planet. But what particularly struck me, were two nebulous undefined spots, *i* and *k*, which were sensibly darker than the

principal zone *cd*; and at *l* a still more remarkable, circular, tho' imperfectly defined spot, somewhat brighter than the luminous interval between the zones, and perfectly similar to the remarkable luminous spot which I had observed in 1786 and 1787 on the same part of Jupiter, and which then led me to some very unexpected inferences concerning the atmosphere of that planet*.

"These favourable circumstances led me to the following accurate observation, which I was certain would prove instructive to me. At $10^h 40' 50''$ I saw the spot *i* at about the middle of its parallel; and immediately after began the occultation; than which a more distinct and beautiful one was perhaps never seen.

"*Immersion.* The western, preceding, first satellite, disappeared behind the sharp bright limb of the moon, at $10^h 43' 12''$.

The second satellite disappeared, without becoming at all indistinct, exactly at $10^h 45' 19''$.

The western limb of Jupiter came in contact, most distinctly, with the eastern limb of the moon, at $10^h 46' 32'', 5$.

Jupiter's eastern limb disappeared, as distinctly, at $10^h 48' 20'', 5$. This immersion took place, as represented in fig. 6. to the eastward of Aristarchus, at about the 25th degree of north latitude.

"The third satellite disappeared, after having been for about one or two seconds faint and indistinct, at $10^h 58' 57'', 5$.

"The fourth satellite, which appeared the least of them all, became undiscernible near the limb, and vanished at about $11^h 2' 16''$.

"*Emersions.* The two preceding first and second satellites were here likewise of use in determining precisely the emerision of both the limbs of Jupiter from the dark hemisphere of the moon.

"The first appearance of Jupiter's western limb was very distinct at $11^h 43' 54''$.

"Emersion of the eastern limb, as distinct, at $11^h 45' 39'', 5$. This emerision took place, as represented in fig. 7. to the north-eastward of Seneca (B, Tab. VIII. of the Frag.), at about the 23d degree of north latitude.

"The emerision of the next, or third satellite, was not observed.

"That of the fourth was distinct at $11^h 59' 1''$.

"This observation gave me the more satisfaction, as it singularly contributed to confirm the discovery I had been so fortunate as to make of the twilight in the moon, and the height and density of the lower stratum of its atmosphere.

"Experience has sufficiently proved, that a stronger will ever obscure a fainter light; and it follows hence, that the light of a bright star approaching the moon, when full or nearly so, will lose something of its lustre: but little can be inferred in favour of an atmosphere either of the Moon or of Mars, from the observation of Cassini; in which, as Dr Herschel has illustrated by some observations of his own*, a star in Aquarius, of the sixth magnitude, and as yet six minutes distant from Mars, diminished in light when both were seen in the same field of the telescope. A mere apparent diminution of light, occasioned by the glare of a larger luminous object, when seen at the same time with a smaller

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Ext. d. p. 75,
and Tab. I.
fig. 6.*

* *Phil.
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smaller one in the field of the telescope, is one thing; and another thing is a real indistinctness of the small luminous body, which increases in proportion as they approach nearer to each other.

"It was very natural for Jupiter to diminish in brightness when it approached so near to the moon, then almost at its full, as to be seen at the same time in the field of the telescope, which was in fact the circumstance of this observation; but I could not observe any progressive variation of light in the eastern and western, equally luminous, disks, proportional to their distances from the limb of the moon, much less a real indistinctness; and this neither when the limbs of the two planets were nearly in contact, nor when Jupiter was partly, or about one half, covered by the moon.

"It was a sight truly gratifying to an eye accustomed to the light of the moon, or in general to similar observations, to behold how Jupiter, at its immersion as well as emersion, being half or more than half covered by the moon, exhibited its belts and other parts as distinctly close to the limb of the moon as it does at some distance from it; and had I not already succeeded in my numerous observations on the atmosphere of the moon, and very recently in those which enabled me to determine its twilight, I should perhaps have adopted the doubts the ancient astronomers entertained concerning the existence of a lunar atmosphere; and this the rather, as when Jupiter in its immersion was so far covered, that the luminous spot *l*, fig. 5. was close to the moon, I could plainly distinguish this spot, although it be in itself by no means very perceptible.

"Such, however, must have been the appearances, according to my new observations and measurements of the twilight of the moon: for if it be proved, that the extent of this twilight, to where it loses itself in the light reflected from the almost wholly illuminated disk of our earth, amounts to no more than an arc of $2^{\circ} 34'$ of the circumference of the moon, and if it be hence demonstrable, that its greatest dilatation does barely amount to $5^{\circ} 8'$, and the perpendicular height of that part of the lower more condensed stratum of its atmosphere, which is capable of reflecting the solar rays, and of producing some other, perhaps more remarkable, obscurities in the stars seen through it, does not exceed 5000 Paris feet, and hence cannot reach above one second of a degree above the limb of the moon; we need not wonder that so small a magnitude, which loses itself in the inequalities of the limb, many parts of which are known to be considerably mountainous, should not become sensible, especially at the approach of a body of so large a diameter as Jupiter, and when so small a magnifying power is applied. And thus may I with confidence assert a perfect coincidence between this and my many other observations.

"The appearance, fig. 8. when Jupiter, at the emersion, the objects being particularly sharp and distinct, came forth from behind the moon, which now covered no more than one quarter of its diameter, was truly splendid and satisfactory: and I must here particularly mention the circumstance, that the part of the moon's dark hemisphere, between its bright terminating edge *mn* and its outward limb, bordering upon the emerging planet *op*, was particularly opaque, and hence produced a very striking effect.

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"I omit entering here upon any farther considerations; and shall conclude with observing, that, after the occultation was completely ended, the luminous spot *l* had at $12^h 1'$ so far advanced in its parallel *de*, as to have reached to within $\frac{1}{5}$, or at most $\frac{1}{4}$, of its whole length of the western limb: and that on the 28th of March, five days after a new moon, I observed an occultation of a very distinct, though telescopic, star, by the dark hemisphere of the moon; in which, agreeably to the above observation, not the least gradual diminution of light or indistinctness could be perceived, the star being seen to vanish on a sudden."

Influence of the Moon on the Human Body, the Weather, &c. The vulgar doctrine concerning the influence of the moon on the changes of weather is very ancient, and has gained credit among the learned without sufficient examination; but it seems now to be pretty generally exploded by philosophers, as equally destitute of all foundation in physical theory, and unsupported by any plausible analogy. The common opinion is, that the lunar influence is exerted at the syzygies and quadratures, and for three days before and after each of those epochs. There are 24 days, therefore, in each synodic month, over which the moon at this rate is supposed to preside; and as the whole consists but of 29 days $12\frac{3}{4}$ hours, only $5\frac{1}{2}$ days are exempt from her pretended dominion. Hence, though the changes of the weather should happen to have no connection whatever with the moon's aspects, and they should be distributed in an equal proportion through the whole synodic month, yet any one who shall predict, that a change shall happen on some one of the 24 days assigned, rather than in any of the remaining $5\frac{1}{2}$, will always have the chances 24 to $5\frac{1}{2}$ in his favour. Men may, therefore, easily deceive themselves, especially in so unsettled a climate as ours. Moreover, the writers who treat of the signs of the weather, derive their prognostics from circumstances which neither argue any real influence of the moon as a cause, nor any belief of such an influence, but are merely indications of the state of the air at the time of observation: such are, the shape of the horns, the degree and colour of the light, and the number and quality of the luminous circles which sometimes surround the moon, and the circumstances attending their disappearance. (See the *Διοσημεία* of Aratus, and the *Scholias* of Theon.) The vulgar soon began to consider these things as causes, which had been proposed to them only as signs: and the notion of the moon's influence on all terrestrial things was confirmed by her manifest effect upon the ocean. See, on this subject, Phil. Trans. vol. lxxv. part 2. p. 178, &c.

The famous Dr Mead was a believer in the influence of the sun and moon on the human body, and published a book to this purpose, intitled *De Imperio Solis ac Lunæ in Corpore humano*: but this opinion has been exploded by most philosophers as equally unreasonable in itself, and contrary to fact. As the most accurate and sensible barometer is not affected by the various positions of the moon, it is not thought likely that the human body should be affected by them. Several learned and ingenious men, however, still consider Dr Mead's doctrine as far from being unfounded.

Harvest-Moon. It is remarkable, that the moon, during the week in which she is full in harvest, rises

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sooner after sun-setting than she does in any other full moon week in the year. By doing so, she affords an immediate supply of light after sun-set, which is very beneficial to the farmers for reaping and gathering in the fruits of the earth: and therefore they distinguish this full moon from all the others in the year, by calling it the *harvest-moon*. For an account of which, see ASTRONOMY, n^o 370, 371.

MOON-Eyes, in the manege. A horse is said to have moon-eyes when the weakness of his eyes increases or decreases according to the course of the moon; so that in the wane of the moon his eyes are muddy and troubled, and at new moon they clear up; but still he is in danger of losing his eye-sight quite.

MOON-Stone, a genus of siliceous earths, of a clear white colour approaching to that of milk. When looked at in a certain position, it reflects a strong light like mother-of-pearl; in others, it shows spots of a carnation colour. It is found in pieces with obtuse angles, sometimes of a quadrangular figure. When broken, it appears evidently foliated. According to Werner it agrees in hardness and most other respects with felt-spar. He tells us, likewise, that it is probably the *androdamas* of Pliny, the common *girafale* of the Italians, and the *water opal* of Ceylon. Sometimes, he tells us, it is classed with the opal, and sometimes with the cat's eye. According to M. Magellan, this stone is of the chalcedony or pseudo-opal kind: it reflects a whitish light, with some various shades of few intermixed colours on a bluish bottom, like the face of the moon when high enough not to appear reddish by the interposition of earthy vapours. The iris, or rainbow-stone, seems to be no other than a moon-stone in which the yellow, purple, and blue rays are most conspicuously reflected. When looked at, it appears of a reddish brown; but on holding it in the light of the sun, we discover the figure of a rainbow. There are, however, several other stones which have the same appearance in the sun's light.

MOON-Wort in botany. See LUNARIA.

MOOR (Sir Karel de), a capital painter of portraits, history, and conversations, was born at Leyden, in 1656: and at first was a disciple of Gerard Douw, with whom he continued for a considerable time. He afterwards studied successively under Abraham Vanden Tempel, Francis Mieris, and Godfrey Schalcken. As soon as he began to follow his profession, the public in a short time did justice to his extraordinary merit; and he took the most effectual method to establish his reputation, by working with a much stronger desire to acquire fame than to increase his fortune. According to Mr Pilkington, he painted portraits in a beautiful style, in some of them imitating the taste, the dignity, the force, and the delicacy of Vandyck; and in others, he showed the striking effect and spirit of Rembrandt. His pictures were always neatly and highly finished; he designed them excellently, and grouped the figures of his subjects with great skill. His works were universally admired; and some of the most illustrious princes of Europe seemed solicitous to employ his pencil. The grand duke of Tuscany desired to have the portrait of De Moor, painted by himself, to be placed in the Florentine gallery; and on the receipt of it, that prince sent him

in return a chain of gold and a large medal of the same metal. The Imperial ambassador count Sinzen-dorf, by order of his master, engaged him to paint the portraits of Prince Eugene and the duke of Marlborough on horseback; and in that performance, the dignity and expression of the figures, and also the attitudes of the horses, appeared so masterly, that it was beheld with admiration, and occasioned many commendatory poems in elegant Latin verse to be published to the honour of the artist; and the emperor, on seeing that picture, created De Moor a knight of the holy Roman empire. He likewise had the honour to paint the portrait of Peter the great czar of Muscovy; and an extraordinary number of other portraits, for which he received very large prices.—His historical paintings were admirable; although he most frequently was employed to paint in a large size, yet he often painted small easel pictures, with subjects of history or conversations; and those are exceedingly valued, having all the merit of neat penciling and sweet colouring added to an elegant taste of design. He died in 1738.

MOOR, in country affairs, denotes an unlimited tract of land, usually over-run with heath.

MOOR-Cock, or *Gor-Cock*. See TETRAO.

MOOR Land, or *moory soil*, in agriculture, is a black, light, and soft earth, very loose, and without any admixture of stones; and with very little clay or sand.

The uppermost stratum of the fen-lands is usually of this earth, and it commonly constitutes a moderately thick or deep bed. Intermixed with water it cannot easily be worked up into a paste; and when with labour worked up into somewhat of a firm mass, its surface appears spongy and porous; and as soon as dry, it easily moulders away to powder.

It is usually soft to the touch, unless it be worked very closely between the fingers; then it shows a mixture of a small quantity of sand, both to the touch and to the eye. It seems indeed to consist almost entirely of pure vegetable matter; and this lying in such plenty on the surface of the fen-lands is the cause of their being so very fertile.

The great disadvantage of the places which have this soil, is their being liable to be glutted with wet; and to remedy the inconveniences arising from thence, the farmers who rent these lands have a custom of burning the soil at proper seasons. It burns very freely and easily, the surface readily catching flame; and a substance somewhat bituminous, usually contained among the soil, helps the burning.

MOORE, or MORE, (Edward), a late ingenious writer, was bred a linen-draper, but quitted business to join the retinue of the muses; and he certainly had a very happy and pleasing talent for poetry. In his *Trial of Selim the Persian*, he complimented lord Lyttelton in an elegant kind of panygeric, couched under the appearance of accusation: and his *Fables for the female sex*, for easy versification, poignant satire, and striking morals, approach nearer to the manner of Gay than any other of the numerous imitations of that author. He wrote also three dramatic pieces; *The Gamester*, a tragedy; *The Foundling*, and *Gil Blas*, comedies. The success of these was not such as they merited: the first of them having met with a cold reception,

Moor,
Moore.

Moore,
Mooring.

ception, for no other apparent reason but because it too nearly touched a favourite and fashionable vice: and the second having been condemned for its supposed resemblance to Sir Richard Steele's *Conscious Lovers*, but to which good judges have been inclined to give it greatly the preference. Mr Moore married a lady of the name of *Hamilton*, daughter to Mr Hamilton table-decker to the princesses; who had herself a very poetical turn, and has been said to have assisted him in the writing of his tragedy. One specimen of her poetry, however, was handed about before their marriage, and has since appeared in print in different collections of songs, particularly in one called the *Goldfinch*. It was addressed to a daughter of the famous Stephen Duck; and begins with the following stanza:

Would you think it, my Duck? (for the fault I must own),
Your Jenny at last is quite covetous grown:
Tho' millions if Fortune should lavishly pour,
I still shou'd be wretched if I had not MORE.

And after half a dozen stanzas more, in which, with great ingenuity and delicacy, and yet in a manner that expresses a sincere affection, she has quibbled on our author's name, she concludes with the following lines:

You may wonder, my girl, who this dear one can be,
Whose merit can boast such a conquest as me:
But you shan't know his name, tho' I told you before,
It begins with an M, but I dare not say MORE.

In the year 1753, Mr Moore commenced a weekly miscellaneous paper, intitled *The World*, by *Adam Fitz-Adam*; in which undertaking he was assisted by Lord Chesterfield with some essays. This paper was collected into volumes, and Mr Moore died soon after.

MOORING, the act of confining and securing a ship in a particular station, by chains or cables, which are either fastened to the adjacent shore, or to anchors in the bottom.

A ship may be either moored by the head, or by the head and stern: that is to say, she may be secured by anchors before her, without any behind; or she may have anchors out, both before and behind her; or her cables may be attached to posts, rings, or moorings, which answer the same purpose.

When a ship is moored by the head with her own anchors, they are disposed according to the circumstances of the place where she lies, and the time she is to continue therein. Thus wherever a tide ebbs and flows, it is usual to carry one anchor out towards the flood, and another towards the ebb, particularly where there is little room to range about; and the anchors are laid in the same manner, if the vessel is moored head and stern in the same place. The situation of the anchors, in a road or bay, is usually opposed to the reigning winds, or those which are most dangerous; so that the ship rides therein with the effort of both her cables. Thus if she rides in a bay, or road, which is exposed to a northerly wind and heavy sea from the same quarter, the anchors passing from the opposite bows ought to lie east and west from each other: hence both the cables will retain the ship in her station with equal effort against the action of the wind and sea.

MOORINGS, in sea-language, are usually an assemblage of anchors, chains, and bridles, laid athwart the bottom of a river or haven, to ride the shipping con-

tained therein. The anchors employed on this occasion have rarely more than one fluke, which is sunk in the water near low-water mark. Two anchors being fixed in this manner in the opposite side of the river, are furnished with a chain extending across from one to the other. In the middle of the chain is a large square link, whose lower end terminates in a swivel, which turns round in the chain as about an axis, whenever the ship veers about with the change of the tide. To this swivel-link are attached the bridles, which are short pieces of cable, well served, whose upper ends are drawn into the ship at the mooring-ports, and afterwards fastened to the masts or cable-bolts. A great number of moorings of this sort are fixed in the harbours adjacent to the king's dock-yards, as Deptford, Chatham, Portsmouth, Plymouth, &c.

MOORLANDS, a tract so called, in the north part of Staffordshire, where the land rises gradually into small hills, which run through the midst of England in one continued ridge, rising higher and higher to Scotland, and sending forth many rivers. The soil here is so foul and cold, that the snows lie almost all the year on the tops of the hills; and it is withal very rugged and barren: it, however, yields plenty of coal, lead, copper, rance-marble, and mill-stones; and some of the limestone hills bear such a sweet though short grass, as is very grateful to the oxen, of which here is a very good breed. It is observed here, that the west wind always brings rain, and the east and south fair weather; that though this tract is full of bogs, it is as healthy as any other part of the county; and that it produces the same plants as the Peak of Derby.

MOORS. See MOROCCO.

MOORS, in the Isle of Man, those who summon the courts for the several sheadings; such as the lord's bailiffs. Every moor has the like office with our bailiff of the hundred.

MOOSE, or ELK. See CERVUS.

MOOT, a difficult case, argued by the young barristers and students at the inns of court, by way of exercise, the better to qualify them for practice, and to defend the causes of their clients. This, which is called *mooting*, is the chief exercise of the inns of court. Particular times are appointed for the arguing moot-cases: the place where this exercise is performed was anciently called *moot-hall*; and there is a bailiff, or surveyor of the moots, annually chosen by the bench, to appoint the moot-men for the inns of chancery, and to keep an account of the performance of exercises. The word is formed either from the Saxon *metan*, *gemetan*, "meeting;" or from the French *mot*, "word."

MOPSUS (fab. hist.), a celebrated prophet, son of Manto and Apollo during the Trojan war. He was consulted by Amphiaraus, king of Colophon, who wished to know what success would attend his arms in a war which he was going to undertake. He predicted the greatest calamities; but Calchas, who had been a soothsayer of the Greeks during the Trojan war, promised the greatest successes. Amphiaraus followed the opinion of Calchas; but the prediction of Mopsus was fully verified. This had such an effect upon Calchas, that he died soon after. His death

Moortlands
||
Mopsus

Mopsus
||
Morai.

is attributed by some to another mortification of the same nature. The two soothsayers, jealous of each other's fame, came to a trial of their skill in divination. Calchas first asked his antagonist, how many figs a neighbouring tree bore? 10,000 except one, replied Mopsus, and one single vessel can contain them all. The figs were gathered, and his conjectures were true. Mopsus now, to try his adversary, asked him how many young ones a certain pregnant sow would bring forth? Calchas confessed his ignorance; and Mopsus immediately said that the sow would bring forth on the morrow ten young ones, of which only one should be a male, all black, and that the females should all be known by their white streaks. The morrow proved the veracity of his prediction; and Calchas died by excess of the grief which his defeat produced. Mopsus after death was ranked among the gods, and had an oracle at Malia, celebrated for the true and decisive answers which it gave—Another *Mopsus*, son of Ampyx and Chloris, born at Titaressa in Thessaly. He was the prophet and soothsayer of the Argonauts, and died at his return from Colchis by the bite of a serpent in Libya. Jason erected him a monument on the sea-shore, where afterwards the Africans built him a temple where he gave oracles. He has often been confounded with the son of Manto, as their professions and their names were alike.

MORÆA, in botany: A genus of the monogynia order, belonging to the triandria class of plants; and in the natural method ranking under the 6th order, *Enfata*. The corolla is hexapetalous; the three interior petals patent, the rest like those of the iris.

MORAI, is the name given at Otaheite in the South Sea to their burying-grounds, which are also

places of worship. This is a pile of stone raised pyramidically upon an oblong base or square 267 feet long and 87 wide. On each side is a flight of steps; those at the sides being broader than those at the ends; so that it terminated not in a square of the same figure with the base, but in a ridge like the roof of a house. There were 11 of these steps to one of these morais, each of which was 4 feet high, so that the height of the pile was 44 feet; each step was formed of one course of white coral stone, which was neatly squared and polished; the rest of the mass (for there was no hollow within) consisted of round pebbles, which from the regularity of their figure seemed to have been wrought. The foundation was of rock-stones, which were also squared. In the middle of the top stood an image of a bird carved in wood, and near it lay the broken one of a fish carved in stone. The whole of this pyramid made part of one side of a spacious area or square 360 feet by 354, which was walled in with stone, and paved with flat stones in its whole extent. About 100 yards to the west of this building was another paved area or court, in which were several small stages raised on wooden pillars about 7 feet high, which are called by the Indians *ewattas*, and seem to be a kind of altars, as upon these are placed provisions of all kinds, as offerings to their gods. On some of them are seen whole hogs, and on others the skulls of above 50, besides the skulls of many dogs. The principal object of ambition among the natives is to have a magnificent morai. The male deities (for they have them of both sexes) are worshipped by the men, and the female by the women; and each have morais, to which the other sex is not admitted, though they have also morais common to both.

Morai.

MORAL PHILOSOPHY, OR MORALS.

MORAL PHILOSOPHY is, "The science of MANNERS OR DUTY; which it traces from man's nature and condition, and shows to terminate in his happiness." In other words, it is "The knowledge of our DUTY and FELICITY;" or, "The art of being VIRTUOUS and HAPPY."

It is denominated an *art*, as it contains a system of rules for becoming virtuous and happy. Whoever practises these rules, attains an habitual power or facility of becoming virtuous and happy. It is likewise called a *science*, as it deduces those rules from the principles and connections of our nature, and proves that the observance of them is productive of our happiness.

It is an art, and a science, of the highest dignity, importance, and use. Its object is man's duty, or his conduct in the several moral capacities and connections which he sustains. Its office is to direct that conduct; to show whence our obligations arise, and where they terminate. Its use, or end, is the attainment of happiness; and the means it employs are rules for the right conduct of our moral powers.

Moral Philosophy has this in common with Natural Philosophy, that it appeals to nature or fact; depends on observation; and builds its reasonings on plain un-

N° 227.

controverted experiments, or upon the fullest induction of particulars of which the subject will admit. We must observe, in both these sciences, how nature is affected, and what her conduct is in such and such circumstances: Or, in other words, we must collect the appearances of nature in any given instance; trace these to some general principles or laws of operation; and then apply these principles or laws to the explaining of other phenomena.

Therefore Moral Philosophy inquires, not how man might have been, but how he is, constituted: not into what principles or dispositions his actions may be artfully resolved; but from what principles and dispositions they actually flow: not what he may, by education, habit, or foreign influence, come to be or do; but what, by his nature, or original constituent principles, he is formed to be and do. We discover the office, use, or destination of any work, whether natural or artificial, by observing its structure, the parts of which it consists, their connection or joint action. It is thus we understand the office and use of a watch, a plant, an eye, or hand. It is the same with a living creature of the rational or brute kind. Therefore, to determine the office, duty, or destination of man; or, in other words, what his business is, or what conduct

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he is obliged to pursue; we must inspect his constitution, take every part to pieces, examine their mutual relations one to the other, and the common effort or tendency of the whole.

It has not ¹en thus, however, that the science has always been taught. The earliest moralists did not erect systems upon a just analysis of the powers of the human mind; nor have all those who thought such a foundation necessary to be laid, deduced their theories from the very same principles. As moral truths are not capable of rigid demonstration, it appears to us, that we cannot more properly introduce the system which we have adopted, than by giving our readers a short view of the most celebrated systems that have been maintained by others. They will thus have an opportunity of judging for themselves of the respective merits of the different theories, and of adopting that which shall appear to them to place practical virtue on the firmest basis.

HISTORY of the Science of MORALS.

¹ Various opinions concerning the criterion of virtue, &c.

WHILST there has been a remarkable agreement among the writers on morality, as to the particular actions which are virtuous and those which are vicious; and whilst they have uniformly taught, that it is our duty and our interest to perform the one and to avoid the other; they have yet differed exceedingly concerning the *test* or *criterion* of virtue, as well as concerning the *principle* or *motive* by which men are induced to pursue it. One cause of this difference in opinion respecting matters of such universal importance, may perhaps be traced to the mistakes into which philosophers are apt to fall concerning the original state of man.

² Probable cause of this variety.

It is very generally taken for granted, that the first men were savages of the lowest rank, and that the race gradually civilized itself during the course of many succeeding ages. Without mutual intercourse, the progress of civilization could never have commenced; and as the practice of justice is absolutely necessary to every species of friendly intercourse, those original savages, it is supposed, must have been just in their dealings, and just upon some principle which has its foundation in human nature. But to develop the principle by which savages are influenced in their conduct, no tedious or intricate process of reasoning can be necessary. It must have a place in every mind, and be instantaneous in all its decisions. Hence it has been supposed, that the principle to which modern philosophers have given the name of the *moral sense*, is instinctive; that it is the sole judge of virtue and vice; and that its admonitions have such authority, as to enforce obedience without regard to the consequences of any action.

Other philosophers, who deny that the moral sense is instinctive, and who yet suppose that the original state of man was savage, are forced to pile hypothesis upon hypothesis, each unnatural in itself, and all contradictory to one another, in order to account for the commencement of civilization and the formation of society. It has been supposed, that the desire of self-preservation and the love of power are the governing principles in human nature; that in the savage state every man had a right to every thing which he could seize by fraud or force; that all had an innate

propensity to invade each other's property; and that hence war, rapine, and bloodshed, prevailed universally, till the savages discovered the expediency of uniting under some form of government for their mutual protection.

But before the original state of man had been made the basis of such opposite theories as these, it would surely have been proper to inquire upon what grounds that state has been supposed to be savage. To us these grounds appear to be nothing better than mere imaginations; the dreams of poets, and of such philosophers as bend facts to their own systems. In the authentic *history* of our species, there is no evidence, indeed there can be no evidence, that the first men were savages; and every thing which we know of human nature leads us to believe, that had they been so, the race could never have been civilized but by the miraculous interposition of some superior being. The only record of the earliest ages of the world to which the smallest credit is due, represents all the nations of the earth as having sprung from one pair, and that pair as having been instructed in their duty by their beneficent Creator. If this be the fact, and no consistent theory can controvert it, the precepts of morality would be originally conveyed from one generation to another; not in a systematical or scientific form, but as the laws of the Universal Sovereign, whose authority demanded implicit obedience. Accordingly we find, that the first teachers of morals were men of superior rank as well as of eminent talents, who formed collections of maxims derived from their ancestors, "with the view of perfecting subordination, polishing manners, and educating youth. Such were the proverbs of Solomon, the words of Agur, and the wisdom of the son of Sirach." These instructors did not analyse the human mind into its various faculties, and build a

³ Modes of communicating instruction by the earliest moralists.

† Bruce's *Elements of the Science of Ethics*.

system of morals either upon a particular instinct pointing to the supreme good, or upon the fitness of things discovered by reason. Short isolated sentences were the mode in which they conveyed their precepts; which they prefaced by observing, that "the fear of the Lord is the beginning of knowledge;" and enforced by the assurance, that "length of days, and long life, and peace, should they add to those who obeyed them." The sayings of the celebrated wise men of Greece were collections of apophthegms, made in the same manner, and delivered with similar views. Thales and Pythagoras†, who founded the one the Ionic and the other the Italic school, made collections of precepts for the conduct as well of a state as of private life. "Neither the crimes nor the thoughts of bad men (said Thales) are concealed from the gods. The only method of being just, is to avoid doing that which we blame in others." Of Pythagoras it is related by Porphyry and Laertius, that from Samos he repaired to Delos, and after presenting an offering of cakes to Apollo, there received, or pretended to receive, moral dogmas from the priests; which he afterwards delivered to his disciples under the character of divine precepts. Amongst these were the following: That, "next to gods and demons, the highest reverence is due to parents and legislators; and that the laws and customs of our country are to be religiously observed."

† Bruce's *Elements, and Enfield's History of Philosophy*.

To these maxims or apophthegms, which, for the sake of delighting the ear and aiding the memory,

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were sometimes delivered in verse, succeeded, as has been supposed, the mode of instruction by fable or allegory. But the truth seems to be, that this method of communicating moral and political wisdom was as ancient as the other; for we have a beautiful specimen of it in the ninth chapter of the book which relates the transactions of the Judges of Israel. The fables of Esop, too, which were written at a very early period, remain lasting models of this species of art among the Greeks.

When the instructors of mankind had proceeded thus far as to give an artificial form to their precepts, they soon advanced a step farther, and reduced their observations into classes or predicaments. Pythagoras, who visited Egypt, has been supposed to have learned from its priests the method of arranging the virtues into distinct classes. But it is the opinion of an excellent writer †, founded on the previous aspects of ethics, and on the comprehensive talents of the Samian philosopher, that the honour of the invention ought to be ascribed to himself. Be this as it may, it was observed by the inventor, that "all the maxims of morality might be referred to the duties which men owe to themselves, and the duties which they owe to each other." Hence the four cardinal virtues of the ancients, PRUDENCE, TEMPERANCE, FORTITUDE, and JUSTICE; of which the first three refer to the individual, and the fourth to society.

Hitherto lessons in morality had not taken a systematic form; but they were gradually approaching to it. Socrates was perhaps the first Pagan philosopher who established all his precepts on one sure and steady basis. In his lectures and discourses, he seems to have had one great object in view ‡, to connect the moral maxims which were fitted to regulate the conduct of mankind, with sublime conceptions respecting the character and government of a supreme Being. The first principles of virtuous conduct which are common to all mankind, are, according to this excellent moralist, laws of God: and the conclusive argument by which he supports this opinion is, that no man departs from these principles with impunity. "It is frequently possible (says he) for men to screen themselves from the penalty of human laws, but no man can be unjust or ungrateful without suffering for his crime; hence I conclude, that these laws must have proceeded from a more excellent legislator than man." From this it would appear, that in the opinion of Socrates, conscience, or the moral sense, approving of any action, is the criterion by which it is known to be virtuous, and the will of God that which obliges men to perform it.

Socrates himself left no writings behind him, nor, as far as we know, offered any regular and complete theory of ethics. His disciples, however, who were numerous and distinguished, became the founders of the celebrated Greek sects. Among them the first great question was, "what are the foundations of virtue?" and the second, "what are the distinctions betwixt good and evil, happiness and misery?" The answers given to these important questions divided the philosophers and their disciples into distinct orders.

In answer to the former question, Plato taught *, that "virtue is to be pursued for its own sake; and

that being a divine attainment, it cannot be taught, but is the gift of God." This seems to differ in nothing but the name from the doctrine of those moderns who place the sole foundation of virtue in the approbation of the moral sense. The founder of the academy indeed has no such phrase as *moral sense* in any of his writings with which we are acquainted; but if virtue cannot be taught, and if it is to be pursued for its own sake, it must in itself be good, and the object of some feeling, whether called *sense*, *instinct*, or *passion*. His solution of the second question agitated among the sects is not indeed very consistent with this necessary inference from his answer to the first; but for his inconsistencies we are not accountable. "Our highest good (he says) consists in the contemplation and knowledge of the first good, which is mind or God; and all those things which are called good by men, are in reality such only so far as they are derived from the first and highest good. The only power in human nature which can acquire a resemblance to the supreme good, is reason; and this resemblance consists in prudence, justice, sanctity, and temperance."

Aristotle, the founder of the Peripatetic school, was the pupil of Plato; but of the two great moral questions he gives solutions somewhat different from those of his master. "Virtue (according to him †) is either theoretical or practical. Theoretical virtue consists in the due exercise of the understanding; practical, in the pursuit of what is *right* and *good*. Practical virtue is acquired by habit and exercise." This theory seems to differ little from that adopted by Cudworth, Clarke, and Price, which shall be considered afterwards. With respect to happiness or good, the doctrine of Aristotle is very rational. "Pleasures (he says) are essentially different in kind. Disgraceful pleasures are wholly unworthy of the name. The purest and noblest pleasure is that which a good man derives from virtuous actions. Happiness, which consists in a conduct conformable to virtue, is either contemplative or active. Contemplative happiness, which consists in the pursuit of knowledge and wisdom, is superior to active happiness, because the understanding is the higher part of human nature, and the objects on which it is employed are of the noblest kind. The happiness which arises from external possessions is inferior to that which arises from virtuous actions; but both are necessary to produce perfect felicity."

The Stoics, another celebrated sect of Greek philosophers, maintained ‡, that "nature impels every man to pursue whatever appears to him to be good." According to them, "self-preservation and defence is the first law of animated nature. All animals necessarily derive pleasure from those things which are suited to them; but the first object of pursuit is, not pleasure, but conformity to nature. Every one, therefore, who has a right discernment of what is good, will be chiefly concerned to conform to nature in all his actions and pursuits. This is the origin of moral obligation." With respect to happiness or good, the stoical doctrine was altogether extravagant: They taught, that "all external things are indifferent, and cannot affect the happiness of man; that pain, which does not belong to the mind, is no evil; and that a

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† Mr
Bruce.

4
The moral
principles
of Socrates.

§ Bruce's
Elements,
and En-
field's Hi-
story, &c.

5
Origin of
the Greek
sects.

* Enfield.

6
Theories
of Plato.

7
Of Aristotle.

† Enfield.

8
Of the Stoics.
† Enfield.

wise man will be happy in the midst of torture, because virtue itself is happiness (B)."

† Div. Leg.
of Moses.

As the Stoics held that there is but one substance, partly active and partly passive, in the universe (see METAPHYSICS, n° 261, 262.), and as they called the active principle *God*, their doctrine, which makes virtue consist in a conformity to *nature*, bears no small resemblance to that of those moderns who rest moral obligation on the *Divine will*. It was therefore on better grounds than has been sometimes supposed, that Warburton, when characterizing the founders of the three principal sects in Greece, represented † *Plato* as the patron of the *moral sense*; *Aristotle*, of the *essential differences*; and *Zeno*, of *arbitrary will*. These principles, when separated from each other, and treated in the manner of the ancients, may not each be able to bear the superstructure which was raised upon it; but the principles of most of the other sects were much less pure, and infinitely more dangerous.

§ Eternal
and immu-
table Mora-
lity.

9
of Aristip-
pus, Demo-
critus, and
Protagoras.

Cudworth §, whose testimony when relating the doctrines of antiquity is entitled to the fullest credit, affirms, that Aristippus the founder of the Cyrenaic school, Democritus, and Protagoras, with their followers among the atomists, taught, that "the distinction between virtue and vice is merely arbitrary; that nothing is just or unjust, sacred or profane, but as it is agreeable or contrary to established laws and customs; that what is just to-day, human authority may make unjust to-morrow; and that present pleasure is the sovereign good of man."

10
And of E-
picurus.

With these impieties, the moral doctrines of Epicurus have very unjustly been confounded. The physical and metaphysical systems of that philosopher are indeed strange compositions of ingenuity and absurdity, truth and falsehood; and the moral precepts of many of his followers were in the highest degree licentious and impure. But his own life was exemplary; and his ethical system, if candidly interpreted, is much more rational than that of the Stoics; though it must be confessed, that no sect produced men of more determined virtue than the school of Zeno.—

* Enfield's
History.

According to Epicurus *, "the end of living, or the ultimate good which is to be sought for its own sake, is happiness. The happiness which belongs to man, is that state in which he enjoys as many of the good things, and suffers as few of the evils incident to human nature as possible; passing his days in a smooth course of tranquillity. Pleasure is in its own nature good, as pain is in its nature evil. The one is therefore to be pursued, and the other to be avoided, for its own sake. Pleasure and pain are not only good and evil in themselves, but they are the measure of what is good or evil in every object of desire and aversion; for the ultimate reason why we pursue one thing and avoid another is, because we expect pleasure from the former, and apprehend pain from the latter. That pleasure, however, which prevents the enjoyment of a greater pleasure, or produces a greater pain, is to be shunned; and that pain, which either removes a greater pain, or procures a greater pleasure, is to be endured."

Upon these self-evident maxims, Epicurus builds his system of ethics; and proves, with great force of argument, "that a steady course of virtue produces the greatest quantity of happiness of which human nature is capable." Without a *prudent* care of the body, and a steady government of the mind to guard the one from diseases and the other from the clouds of prejudice, happiness is unattainable. By *temperance* we enjoy pleasure, without suffering any consequent inconvenience. *Sobriety* enables us to content ourselves with simple and frugal fare. *Gentleness*, as opposed to an irascible temper, greatly contributes to the tranquillity and happiness of life, by preserving the mind from perturbation, and arming it against the assaults of calumny and malice. *Fortitude* enables us to bear those pains which prudence cannot shun, and banishes fear from the mind; and the practice of *justice* is absolutely necessary to the existence of society, and by consequence to the happiness of every individual." These reasonings come home to every man's bosom; and had not this philosopher, by denying the providence, if not the being, of God, most unhappily excluded from his system the very possibility of a future state of retribution, his moral philosophy would have been the most rational, and of course the most useful, of any that was taught in the schools of Greece. This enormous defect, however, laid it open to the grossest corruptions; and by his followers it was in fact corrupted so as to countenance the most impure and criminal pleasures of sense.

These several systems of ethics continued to be cultivated with more or less purity through all the revolutions of the Grecian states, and they were adopted by the Romans after Greece itself became a province of the empire. They had been introduced into Egypt during the reigns of the Ptolemies, and were taught with much celebrity in the schools of Alexandria.—The philosophy which was most cultivated in those schools was that of Plato; but from a desire of uniformity which took possession of the Alexandrian Platonists, many of the dogmas of Aristotle and Zeno, as well as the extravagant fictions of the east, were incorporated with the principles of the old academy.—The patrons of this heterogeneous mass have been called *eclectic* philosophers, because they professed to select from each system those doctrines which were rational and important, and to reject every thing which was false or futile; but they added nothing to the purity of Plato's ethics, and they increased the obscurity and mysticism of his physics and metaphysics.

11
The eclec-
tic philoso-
phers of
Alexan-
dria.

After the subversion of the Roman empire, every species of philosophy, if syllogistic wrangling deserve not that name, was banished for ages from the schools of Europe; and ethics, properly so called, gave place to ecclesiastical casuistry, and to the study of the civil and canon law. When the Greeks, whom the fury and fanaticism of Mahomet II. had driven from Constantinople, introduced into Italy the knowledge of their own language, the cabinets of ancient philosophy were again unlocked; the systems of the different sects were adopted with the utmost avidity; and, without

12
Extinction
and revival
of moral
science in
Europe.

M m 2

accurate

(B) Since this short history was written, a very pleasing view of Stoicism has been given to the public in Ferguson's *Principles of moral and political Science*; a work which the student of ethics will do well to consult. Perhaps the amiable author may unintentionally have softened the austere dogmas of the Porch, by transfusing into them something of the mild spirit of the gospel; but if so, he has much improved the system of Zeno.

accurate investigation of their respective merits, men became Platonists, Peripatetics, or Stoics, as fancy or caprice prompted them to choose their leaders. The *author* of Aristotle, in particular, had not less authority over his modern admirers than it had of old in the Lyceum at Athens. At length the spirit of Luther and the genius of Bacon broke these fetters, and taught men to think for themselves as well in science as in religion. In physics, the effects produced by the writings of Bacon were great and rapid; for in physics the ancient theories were totally and radically wrong.—With respect to morals, however, the case was different. Each of the celebrated schools of antiquity was in possession of much moral truth, blended indeed with error; and long after the Stagyrice and his rivals had lost all influence in physical science, philosophers of eminence followed them implicitly in the science of ethics.

13
Theories
of Hobbes.

At this day, indeed, there is hardly a theory of morals at all distinguished, to which something very similar may not be found in the writings of the ancients.—Hobbes adopted the principles of Democritus and Protagoras, and taught expressly that “there is no criterion of justice or injustice, good or evil, besides the laws of each state; and that it is absurd to inquire at any person except the established interpreters of the law, whether an action be right or wrong, good or evil (A).” These impious absurdities have been often confuted. Cudworth, who composed his *True Intellectual System of the Universe* in order to trace the metaphysical atheism of Hobbes to its source, and to expose it to the public in all its weakness, undertook likewise to overthrow his ethical system, in a treatise, intitled *Of Eternal and Immutable Morality*. That work was left unfinished; but the theory of its great author was adopted, illustrated, and very ably supported, by the Doctors Clarke and Price.

14
Of Cud-
worth,
Clarke,
and Price.

According to these three admirable scholars, “we feel ourselves irresistibly determined to approve some actions, and to disapprove others. Some actions we cannot but conceive of as *right*, and others as *wrong*; and of all actions we are led to form some idea, as either *fit* to be performed or *unfit*, or as neither fit nor unfit to be performed, i. e. as *indifferent*. The power within us which thus perceives and determines, they declare to be the *understanding*; and they add, that it perceives or determines immediately or by intuition, because *right* and *wrong* denote *simple ideas*. As there are some propositions, which when attended to necessarily determine all minds to *believe* them, so are there some actions whose natures are such, that when observed all rational beings immediately and necessarily *approve* them. He that can impartially attend, it is said, to the nature of his own perceptions, and determine that when he conceives gratitude or beneficence to be *right*, he perceives nothing *true* of them, or *understands* nothing, but only *suffers* from a sense, has a turn of mind which appears unaccountable: for the more we examine, the more indisputable it will appear to us, that we express *necessary* truth, when we say of some actions that they are right, and of others that they are wrong.” It is

added, that “we cannot perceive an action to be right without *approving* it, or *approve* it without being conscious of some degree of *satisfaction* and complacency; that we cannot perceive an action to be wrong without *disapproving* it, or *disapprove* it without being *displeased* with it; and that the *first* must be liked, the *last* disliked; the *first* loved, the *last* hated.” By the patrons of this system, *obligation* to action, and *rightness* of action, are held to be coincident or identical. “Virtue, they affirm, has a real, full, obligatory power, antecedently to all laws, and independently of all will; for obligation is involved in the very nature of it. To affirm that the performance of that which to omit would be wrong is not obligatory, unless conducive to private good, or enjoined by a superior power, is a manifest contradiction*.”

* Price's
Review,
and Clarke
on the Attri-
butes.

Few men have deserved better of letters and philosophy than Cudworth, Clarke, and Price; and yet their theory of morals appears to us to be contradictory and unintelligible. It is certainly romantic, and founded upon principles which, if they be denied, no man by argument can be compelled to grant. There is, say they, an absolute right and wrong, fitness and unfitness, in actions; but if so, the actions which are *right* and *fit* must be right and fit for something, because fitness, which respects no end, is wholly inconceivable. To say that any particular action is *fit*, and yet fit for *no particular purpose*, is just as absurd as to say that the angles at the base of an isosceles triangle are *equal*, but neither to *one another*, nor to *any other angles*; and we may with no less propriety talk of the relation of equality attaching to a particular angle, and to nothing else with which the angle is equal, than of the *absolute* fitness or rightness of any action or course of actions. If it be said that such actions are fit and right, because they tend to promote the harmony of the world and the happiness of men, this may be granted; but it overturns the intellectual theory from its very foundation. Actions which are fit and right only for their consequences, are approved and liked for the sake of those consequences; and the happiness of men, among whom the virtuous person himself is certainly to be included, is the motive or ultimate obligation to their performance.

Similar to this theory, and liable to the same objections, is that which resolves moral approbation into a sense of propriety; for if actions be approved because they are proper, it must be because they are proper for some *end* or *purpose*, propriety in the abstract being a word without meaning.

Many philosophers, feeling the force of these and of similar objections to the intellectual theory of Cudworth, Clarke, and Price, as well as to a sense of *propriety* in the abstract, have had recourse to another hypothesis apparently better founded. Observing that all mankind decide on the morality of characters and actions instantaneously, without weighing their consequences in the balance of reason, they suppose that such decisions are made by an *instinct* of our common nature, implanted in the human breast by the hand that formed it. To this instinct some of them give the

15
Of Lord
Shaftesbury
and Hut-
cheson, &c.

(c) Doctrinas de justo et injusto, bono et malo, præter leges in unaquaque civitate constitutas, authenticas esse nullas: et utrum aliqua actio justa vel injusta, bona vel mala futura sit, a nemine inquirendum esse, præterquam ab illis, quibus legum suarum interpretationem civitas demandaverit. *De cive*, p. 343.

the name of *conscience*, and others that of *moral sense*, in contradiction to *external sense*, the other great and universal inlet of human knowledge. By this *moral sense* we intuitively discover an essential difference in the *quality* of all thoughts and actions, and a general distinction of them into *good* and *evil*, just as by the *tongue* and *palate* we discover an essential difference in the *taste* of all objects, and a general distinction of them into *pleasant* and *unpleasant*. The ablest advocates for this instinctive system agree, that the moral sense is the immediate and involuntary criterion of only a few general truths, which, in their joint operation upon the mind, lay the basis of moral obligation. Others have carried it to what we think a very dangerous extreme; as, by affirming that we cannot prove, in regard to our moral feelings, that they are conformable to any extrinsic and eternal relations of things, they seem to wish that reason were banished from the science of ethics. Were this true, it would in many cases be impossible to distinguish the prejudices of early education from the pure dictates of original instinct, and the most pernicious conduct might be sanctified with the approbation of what would be deemed the ultimate test of virtue and vice.

To remedy the defects of the intellectual and instinctive theories of morality, Mr Hume blended them together; and, upon the broader basis of reason and internal sense co-operating with each other, he reared a system which, though different from those of all his predecessors, he rendered plausible, and supported with his usual ingenuity.

According to him, *sentiment* and *reason* concur in almost all moral determinations; and he proves, that for this purpose "there is implanted in the human breast a disinterested principle of *benevolence* or *sympathy*, which makes men take pleasure in each other's happiness. The merit or demerit of actions consists wholly in their utility or natural tendency to add to the sum of human happiness; and the same he holds to be true of qualities whether bodily or mental. This utility or natural tendency it is the office of reason to discover; for that faculty alone can trace relations and consequences. Such qualities or actions as reason discovers to be useful, either to the individual or to society, the instinctive principle of benevolence makes us instantly approve, and this approbation constitutes their morality. Thus, temperance, fortitude, courage, and industry, &c. reason discovers to be useful to him who possesses them; and upon this discovery they are approved of by the sentiment of sympathy. They are therefore moral qualities, and the sources of the *private* virtues. In like manner, generosity, cheerfulness of temper, mercy, and justice, are discovered to be useful to society; and are accompanied with the approbation of that sentiment of sympathy which makes every man feel a satisfaction in the felicity of all other men. They therefore constitute the *social* virtues. Of every quality and every action, the merit or demerit, and of consequence the degree of approbation or disapprobation which is bestowed upon it, is in exact proportion to its utility and the circumstances of the case in which it occurs. The social virtues are therefore greater than those which are private, and one social virtue is greater than another; but every quality and every action which is useful, either to society or to the individual, is more

or less virtuous, provided the good of the individual be considered as subordinate to the good of the public."

This theory is ingenious; and in placing the merit of actions in their utility, it furnishes a criterion of virtue which can be employed by reason: but it seems not to be wholly free from error, and it is obviously defective. By pretending that the same sentiment of approbation is given to useful actions voluntarily performed, and to useful qualities which are merely constitutional, Mr Hume confounds the merit of virtuous habits with the value of natural talents. Yet every man's consciousness will surely tell him, that the feeling or sentiment which attaches to deeds of justice, clemency, and beneficence, is very different from that which attaches to beauty of form, strength of body, vigour of mind, and mere extent of capacity. All these actions and qualities are useful; but when we approve of the former, besides attending to their utility, we consider them as in the man's power, and attribute the merit of them immediately to himself. When we approve, or rather admire, the latter on account of their utility, we know them to be not in the man's power, and we attribute the merit of them immediately to the Author of nature.

But the defects of this theory are in practice more pernicious than its errors. The author well observes, that the end of all moral speculations is to teach us our duty; and, by proper representations of the deformity of vice and beauty of virtue, to beget correspondent habits, and engage us to avoid the one and embrace the other: but the theory under review holds out no motive sufficient in all cases for this purpose.

It is indeed true, as Mr Hume affirms, that the virtues which are immediately useful or agreeable to the person possessed of them, are desirable in a view to self-interest, and that a regard to self-interest ought to engage us in their pursuit. It is likewise true, that the virtues which are *useful* and *agreeable* to others, are generally more desirable than the contrary qualities: for as by the constitution of our nature no enjoyment is sincere without some reference to company and society; so no society can be agreeable, or even tolerable, where a man feels his presence unwelcome, and discovers all around him symptoms of disgust and aversion. These considerations he deems sufficient to enforce the duties of humanity, clemency, and beneficence; but he states a case himself, in which they would certainly fail to make a man abstain from his neighbour's property. The greater part of property he considers, and rightly considers, as having its foundation in human laws, which are so calculated as to preserve the peace and promote the general good of the society, at the unavoidable expence sometimes of the individual. Now, in particular incidents, a sensible knave, by secretly purloining from the hoards of a worthless miser, might make himself comfortable and independent for life, without causing any breach in the social union, and even without hurting a single individual. What then should hinder him from acting thus? His self-interest would be promoted; and if he possessed a generous spirit, he might gratify his sentiment of benevolence or sympathy by doing good with his money to the poor, which the miser never did. For enforcing the uniform practice of justice in such cases as this, Mr Hume's theory of morals contains no adequate motive; but a very

17
A system of
ethics built
upon reli-
gion.

sufficient one is held out by the system which we are now to consider.

That system, which seems to have been unknown to the ancients, is built upon religion, of which indeed it constitutes a very essential part; and those by whom it has been taught, maintain that no other foundation is sufficient to bear a regular superstructure of practical ethics. The philosophers of this school (D) define virtue to be "the doing good to mankind, in obedience to the will of God, and for the sake of everlasting happiness." So that with them "the good of mankind" is the *subject*, "the will of God" the *criterion* or *rule*, and "everlasting happiness" the *motive*, of human virtue. The moral sense, supposing it real, they consider as a very inadequate rule of conduct, as being in many cases difficult to be distinguished from prejudice; and many of them confidently deny its existence. The other rules, such as the *fitness of things*, abstract right, the *truth of things*, the *law of reason*, &c. they consider either as unintelligible, or as relative to some end by which the rules must themselves be tried. The two great questions, which in the system of these religious philosophers demand solution, are: 1st, By what means shall a man in every case discover precisely what is the will of God? and, 2^{dly}, What evidence have we that there will be a future state of retribution and of everlasting happiness?

Of these two questions, the latter belongs wholly to religion; and to solve it they call in the aid of revelation, as well as of that which is called the religion of nature. The former question is in the province of morality; and to find answers to it which will apply to every case, is the whole business of their system.

The will of God respecting human conduct may be discovered by reasoning *à priori* from his existence and attributes, or *à posteriori* from the tendency of his works. Being himself independent and all-perfect, it is inconceivable that his view in creating the world could be any thing else than to communicate some portion of his own felicity. (See METAPHYSICS, n^o 312.) This conclusion is agreeable to what we perceive of his works, in which there are a thousand contrivances, all tending to give happiness to man, and to all animated nature; and not one of which the natural tendency is to inflict pain, or prove ultimately injurious. Mankind are linked together by various ties, and made to depend in a great measure upon each other's conduct. That conduct, therefore, which is naturally productive of the greatest sum of human happiness, must be agreeable to the will of God; or, in other words, virtuous conduct. That, of which the natural tendency is the reverse, must be vicious; and that conduct, if there be any such, which tends to produce neither happiness nor misery, must be indifferent, i. e. neither morally good nor morally evil. It is to be observed, however, that as, previous to their own obedience or disobedience, all men stand in the same relation to their Creator, it must be his will that an equal portion of the happiness of which human nature is capable be communicated to all by whom that nature is shared. Whence it follows, that only such conduct as, if universally pursued by all men in the same station and circumstances, would be productive of the greatest

sum of human happiness on the whole, can be agreeable to the will of the Creator; and that, in judging of the morality of actions, we are not to regard their immediate consequences in any particular case, but their natural and ultimate tendency if performed in all cases.

This is a criterion of virtue which differs widely from the local or occasional utility set up by Mr Hume; for the particular consequences of an action and its general tendency may often be at variance, so that what might in certain circumstances be immediately useful, would yet be highly criminal and ultimately pernicious. The general tendency of actions, too, may be always known, and known with the utmost certainty: the whole of their particular consequences can never be discovered. One thing, however, is evident, that if all men in their respective stations would regulate their conduct by the natural tendency of every action, the *particular* and *general* consequences of their conduct would be the same, and the greatest happiness would result from it of which human nature is in this world capable. And therefore, since it is only through the perverseness of some person or persons concerned, that the *particular consequences* of any action, of which the *natural tendency* is to produce *misery*, can ever bring *happiness* to a single individual; it can no more be the will of God that we make these *occasional* and *distorted* consequences the rule of our conduct, than it can be his will that the *vices* of other men should be the basis of our *virtues*. According to this scheme of morals, which rests all obligation on private happiness, the whole difference between an act of *prudence* and an act of *duty*, is this: That in the former case we consider only what we shall gain or lose in this world; in the latter, what we shall gain or lose in the world to come.

Although the patrons of this theory question the reality of the moral sense as an instinct, they allow that a sentiment of approbation or disapprobation of actions, according as they are virtuous or vicious, is generated by the associating principle (see INSTINCT, and METAPHYSICS, n^o 97.); and that this sentiment, though factitious, operates instantaneously as if it were instinctive. They insist that our earliest actions are the result of imitation; that when we first begin to trace consequences, education and the desire of immediate enjoyment are our only guides; that as our mind expands and our knowledge increases, the hopes and fears of futurity become the *motives*, and the will of God the *rule* of our conduct; and that long practice in virtue, upon these principles, produces habits by which we go on with satisfaction in the same course, without looking forward, on every *particular* occasion, to the ultimate consequences and first motives of our actions. Thus do habits of justice, benevolence, clemency, and moral approbation, spring, through a proper course of discipline, out of the selfish principle; and when these habits are completely formed and deeply rooted, man has attained the utmost perfection of which he is capable in this state of probation, and is fitted for another of retribution and happiness.

That these philosophers have not a just view of human nature, when they deny that there is any innate principle of benevolence in man, we shall endeavour to shew.

19
Defects
and excel-
lency of the
system.

(D) GASTRELL, CUMBERLAND, PUFFENDORF, NORRIS, BERKELEY, GAY, LOW, RUTHERFORTH, SOAME JENYNS, Dr JOHNSON, Mr PALEY, and Mr GISBORNE, &c.

† Stuart's
Elements of
the Philosophy of the
Human
Mind.

‡ Johnson.

to show when we lay the foundation of that theory which we think deserves to be preferred to all others; but we fully agree with a candid and able writer†, who seems to consider them as under the same mistake, "that their theory of morals has no tendency to weaken the foundations of virtue; and that by the account which it gives of the rise of the social affections, it obviates many of the arguments which had formerly been urged against the selfish system." Nay, we scruple not to confess, that the mode of investigation which it employs in *all cases* to discover the will of God, may in *some cases* be necessary in any system which does not banish the use of reason from the science of ethics. On this account, as well as out of respect to the first moralist‡ of the age, who affirms, that "it must be embraced by all who are willing to know why they act, or why they

forbear, to give any reason of their conduct to themselves or to others," we shall apply it to one of those cases of social duty which Mr Hume's principle of utility could not resolve. Such an example will enable the meanest of our readers to decide between the merits of it and of the theory which we shall adopt; or, as we rather hope, it will show them that the two theories lead to the same practical conclusions.

Having thus given our readers a short view of the most celebrated systems of ethics which have prevailed from the earliest ages of the world to the present day, we now proceed, agreeably to our definition of the science, to trace man's duty from his nature and connections, and to show that the steady practice of virtue must terminate in his ultimate happiness.

PART I.

CHAP. I. Of MAN and his CONNECTIONS.

20
Man's infant state.

MAN is born a weak, helpless, delicate creature, unprovided with food, clothing, and whatever else is necessary for subsistence or defence. And yet, exposed as the infant is to numberless wants and dangers, he is utterly incapable of supplying the former, or securing himself against the latter. But, though thus feeble and exposed, he finds immediate and sure resources in the affection and care of his parents, who refuse no labours, and forego no dangers, to nurse and rear up the tender babe. By these powerful instincts, as by some mighty chain, does nature link the parent to the child, and form the strongest moral connection on his part, before the child has the least apprehension of it. Hunger and thirst, with all the sensations that accompany or are connected with them, explain themselves by a language strongly expressive, and irresistibly moving. As the several senses bring in notices and informations of surrounding objects, we may perceive in the young spectator early signs of a growing wonder and admiration. Bright objects and striking sounds are beheld and heard with a sort of commotion and surprise. But, without resting on any, he eagerly passes on from object to object, still pleased with whatever is most new. Thus the love of novelty is formed, and the passion of wonder kept awake. By degrees he comes acquainted with the most familiar objects, his parents, his brethren, and those of the family who are most conversant with him. He contracts a fondness for them, is uneasy when they are gone, and charmed to see them again. These feelings become the foundation of a moral attachment on his side; and by this reciprocal sympathy he forms the domestic alliance with his parents, brethren, and other members of the family. Hence he becomes interested in their concerns; and feels joy or grief, hope or fear, on their account, as well as his own. As his affections now point beyond himself to others, he is denominated a good or ill creature, as he stands well or ill affected to them. These, then, are the first links of the moral chain; the early rudiments, or outlines, of his character; his first rude essays towards agency, freedom, manhood.

When he begins to make excursions from the nur-

fery, and extends his acquaintance abroad, he forms²¹ a little circle of companions; engages with them in^{His childhood.} play, or in quest of adventures; and leads, or is led by them, as his genius is more or less aspiring. Though this is properly the season in which appetite and passion have the ascendant, yet his imagination and intellectual powers open apace; and as the various images of things pass before the mental eye, he forms variety of tastes; relishes some things, and dislikes others, as his parents, companions, and a thousand other circumstances, lead him to combine agreeable or disagreeable sets of ideas, or represent to him objects in alluring or odious lights.

As his views are enlarged, his active and social powers expand themselves in proportion; the love of action, of imitation, and of praise, emulation, curiosity, docility, a passion for command, and fondness of change. His passions are quick, variable, and pliant to every impression; his attachments and disgusts quickly succeed each other. He compares things, distinguishes actions, judges of characters, and loves or hates them, as they appear well or ill affected to himself, or to those he holds dear. Mean while he soon grows sensible of the consequences of his own actions, as they attract applause, or bring contempt: he triumphs in the former; and is ashamed of the latter, wants to hide them, and blushes when they are discovered. By means of these powers he becomes a fit subject of culture, the moral tie is drawn closer, he feels that he is accountable for his conduct to others as well as to himself, and thus is gradually ripening for society and action.

As man advances from childhood to youth, his²² fions as well as perceptions take a more extensive range. New senses of pleasure invite him to new pursuits; he grows sensible to the attractions of beauty, feels a peculiar sympathy with the sex, and forms a more tender kind of attachment than he has yet experienced. This becomes the cement of a new moral relation, and gives a softer turn to his passions and behaviour. In this turbulent period he enters more deeply into a relish of friendship, company, exercises, and diversions; the love of truth, of imitation, and of design, grows upon him; and as his connections spread among his neighbours, fellow-citizens, and countrymen,

Of Man
and his
Connections.

trymen, his *thirst of praise, emulation, and social affections* grow more intense and active. Mean while, it is impossible for him to have lived thus long without having become sensible of those more august signatures of order, wisdom, and goodness, which are stamped on the visible creation; and of those strong suggestions within himself of a parent mind, the source of all intelligence and beauty; an object as well as source of that activity, and those aspirations which sometimes rouse his inmost frame, and carry him out of himself to an almighty and all-governing power: Hence arise those sentiments of *reverence*, and those affections of *gratitude, resignation, and love*, which link the soul with the Author of Nature, and form that most sublime and god-like of all connections.

23
His man-
hood.

Man having now reached his prime, either new passions succeed, or the old set are wound up to an higher pitch. For, growing more sensible of his connections with the public, and that particular community to which he more immediately belongs; and taking withal a larger prospect of human life, and its various wants and enjoyments; he forms more intimate friendships, grasps at power, courts honour, lays down cooler plans of interest, and becomes more attentive to the concerns of society: he enters into family connections, and indulges those charities which arise from thence. The *reigning* passions of this period powerfully prompt him to provide for the decays of life; and in it *compassion* and *gratitude* exert their influence in urging the *man*, now in full vigour, to requite the affection and care of his parents, by supplying their wants, and alleviating their infirmities.

24
Old age.

At length human life verges downwards; and *old age* creeps on apace, with its *anxiety, love of ease, interestedness, fearfulness, foresight, and love of offspring*. —The experience of the aged is formed to direct, and their coolness to temper, the heat of youth: the former teaches them to look back on past follies; and the latter to look forward into the consequences of things, and provide against the worst. Thus every age has its peculiar genius and set of passions corresponding to that period, and most conducive to the prosperity of the rest. And thus are the *wants* of one period supplied by the *capacities* of another, and the *weaknesses* of one age tally to the *passions* of another.

25
Passions of
every age.

Besides these, there are other passions and affections of a less *ambulatory* nature, not peculiar to one period, but belonging to every age, and acting more or less in every breast throughout life. Such are *self-love, benevolence, love of life, honour, shame, hope, fear, desire, aversion, joy, sorrow, anger*, and the like. The two first are affections of a cooler strain; one pointing to the good of the individual, the other to that of the species: *joy* and *sorrow, hope* and *fear*, seem to be only modifications, or different exertions, of the same original affections of *love* and *hatred, desire* and *aversion*, arising from the different circumstances or position of the object desired or abhorred, as it is present or absent. From these likewise arise other *secondary* or *occasional* passions, which depend, as to their existence and several degrees, upon the original affections being gratified or disappointed; as *anger, complacence, confidence, jealousy, love, hatred, dejection, exultation, contentment, disgust*, which do not form *leading* passions, but rather hold of them.

Nº 227.

By these simple but powerful springs, whether *periodical* or *fixed*, the life of man, weak and indigent as he is, is preserved and secured, and the creature is prompted to a constant round of action, even to supply his own numerous and ever-returning *wants*, and to guard against the various *dangers* and *evils* to which he is obnoxious. By these links men are connected with each other, formed into families, drawn into particular communities, and all united as by a common league into one system or body, whose members feel and sympathise one with another. By this admirable adjustment of the constitution of *man* to his *state*, and the gradual evolution of his powers, order is maintained, society upheld, and human life filled with that variety of passion and action which at once enliven and diversify it.

This is a short sketch of the *principal movements* of the human mind. Yet these movements are not the whole of man; they impel to action, but do not direct it: they need a *regulator* to guide their motions, to measure and apply their forces; and accordingly they have one that naturally *superintends* and *directs* their action. We are conscious of a principle within us, which examines, compares, and weighs things; notes the differences, observes the forces, and foresees the consequences, of affections and actions. By this power we look back on past times, and forward into futurity, gather experiences, estimate the real and comparative value of objects, lay out schemes, contrive means to execute them, and settle the whole order and œconomy of life. This power we commonly distinguish by the name of *reason* or *reflection*, the business of which is not to suggest any original notions or sensations, but to canvass, range, and make deductions from them.

We are intimately conscious of another principle within us, which approves of certain *sentiments, passions, and actions*, and disapproves of their contraries. In consequence of the decisions of this inward judge, we denominate some actions and principles of conduct *right, honest, good*; and others *wrong, dishonest, ill*. The former excite our *esteem, moral complacence, and affection*, immediately and originally of themselves, without regard to their consequences, and whether they affect our interest or not. The latter do as naturally and necessarily call forth our *contempt, scorn, and aversion*. That power by which we perceive this difference in affections and actions, and feel a consequent relish or dislike, is commonly called *conscience* or the *moral sense*.

That there is such a power as this in the mind of every man of sound understanding, is a fact which cannot be controverted; but whether it be an instinctive power, or the result of early and deep-rooted associations, has been long and ably debated. The question is of importance in the science of human nature, as well as in ascertaining the standard of practical virtue; but to us it appears that the contending parties have carried their respective opinions to dangerous extremes.

When it is affirmed, as it sometimes has been, that reason has nothing to do in ethical science, but that in every possible situation our duty is pointed out and the performance of it enforced by mere sentiment, the consequence seems to be, that virtue and vice are no-
thing

Of Man
and his
Connections.

26
Their joint
effects.

27
The direc-
ting power.

28
The judg-
ing or ap-
proving
powers.

Of Man
and his
Con-
nections.

29
An attempt
to prove
that we
have from
nature no
such
powers,

thing permanent in themselves, but change their nature according to local circumstances. Certain it is, that sentiment has in similar situations approved of very different practices in different ages and different nations. At present this sentiment in Europe approves of the universal practice of justice, and of parents protecting their children, whether well or ill formed, whether strong or weak: but in Sparta we know that theft, if dexterously practised, was approved, and not unfrequently rewarded; and that the exposition of lame and deformed children was not only permitted, but absolutely enjoined. There is nothing which our conscience or moral sense condemns with greater severity, or views as a crime of a deeper dye, than childrens unkind treatment of their aged parents; yet there are savages, among whom instincts of all kinds ought to prevail in greater purity than in civilized nations, whose moral sense permits them to put their aged and decrepid parents to death. If this sense be instinctive, and the sole judge of right and wrong, how comes it to decide so differently on the same line of conduct in different ages and distant countries? The instincts of brutes, in similar circumstances, prompt uniformly to similar actions in every age and in every region where the species is found; and the external senses of man afford in all nations the same unvaried evidence concerning their respective objects. To these observations we may add, that instincts must be calculated for the state of nature, whatever that state may be, and therefore cannot be supposed capable of directing our steps through all the labyrinths of polished society, in which duties are to be performed that in a state of nature would never have been thought of.

But though for these reasons it is apparent that mere sentiment, whether called conscience or the moral sense, would *alone* be a very unsafe guide to virtue in every individual case that may occur, we think that those who resolve all such sentiment into habit and the effect of education, without giving any part of it to nature, advance an opinion which is equally ill-founded and not less dangerous. There are, indeed, men who affirm that all benevolence is hypocrisy, friendship a cheat, public spirit a farce, fidelity a snare to procure trust and confidence; and that while all of us at bottom pursue only our private interest, we wear those fair disguises, in order to put those off their guard with whom we have to deal, and to expose them the more to our wiles and machinations. Others again, too virtuous to accuse themselves and all mankind of direct knavery, yet insist, that whatever affection one may feel, or imagine he feels, for others, no passion is or can be disinterested; that the most generous friendship, however sincere, is only a modification of self-love; and that even unknown to ourselves we seek only our own gratification, while we appear the most deeply engaged in schemes for the liberty and happiness of mankind.

Surely the mildest of these representations is an exaggerated picture of the selfishness of man. Self-love is indeed a very powerful as well as an essential principle in human nature; but that we have likewise an instinctive principle of benevolence, which, without any particular regard to our own interest, makes us feel pleasure in the happiness of other men, is a fact which we think admits of very complete proof. For, as Mr

Hume well argues, "when a man grieves for a friend who could be of no service to him, but on the contrary stood in need of his constant patronage and protection, how is it possible to suppose that such passionate tenderness arises from self-interest, which has no foundation in nature? What interest (asks the same deep thinker) can a fond mother have in view, who loses her health by her assiduous attendance on her sick child, and afterwards languishes and dies of grief when freed by its death from the slavery of attendance?—Have we no satisfaction (continues he) in one man's company above another's, and no desire of the welfare of our friend, even though absence or death should prevent us from all participation in it? Or what is it commonly that gives us any participation in it, even while alive and present, but our affection and regard to him?" Nor is it to contemporaries and individuals alone, that, independent of all interest, we feel a benevolent attachment. We constantly bestow praise on actions calculated to promote the good of mankind, though performed in ages very distant and in countries most remote; and he who was the author of such actions is the object of our esteem and affection. There is not perhaps a man alive, however selfish in his disposition, who does not applaud the sentiment of that emperor, who, recollecting at supper that he had done nothing in that day for any one, exclaimed with regret, that the day had been lost! yet the utmost subtilty of imagination can discover no appearance of interest that *we* can have in the generosity of *Titus*, or find any connection of our present happiness with a character removed so far from us both in time and in place. But, as Mr Hume justly observes, if we even feign a character consisting of all the most generous and beneficent qualities, and give instances in which these display themselves, after an eminent and most extraordinary manner, for the good of mankind, we shall instantly engage the esteem and approbation of all our audience, who will never so much as inquire in what age or country the accomplished person lived.

These are facts which cannot be controverted; and they are wholly unaccountable, if there be not in human nature an instinctive sentiment of benevolence or sympathy which feels a disinterested pleasure in the happiness of mankind. But an end in which we feel pleasure we are naturally prompted to pursue; and therefore the same sentiment impels every man, with greater or less force, to promote the happiness of other men, which by means of it becomes in reality his own good, and is afterwards pursued from the combined motives of benevolence and self-enjoyment. For in obeying this sentiment we all feel an inward *complacency*, *self-approbation*, or consciousness of *worth* or *merit*; and in disobeying it, which cannot be done but with reluctance, we feel *remorse*, or a consciousness of *unworthiness* or *demerit*. It appears, however, from history, that the sentiment, as it is instinctive, points only to the good of mankind, without informing us how that good is to be promoted. The means proper for this purpose must be discovered by reason; and when they are brought into view, this *sentiment*, *conscience*, or *moral sense*, instantly shows us that it is our duty to pursue them.

Hence we see how different lines of conduct may in similar circumstances be approved of as virtuous in different

Of Man
and his
Con-
nections.

30
Examined
and shown

Of Man
and his
Connec-
tions.

31
To origi-
nate in the
objector's
mistaking
the extent
of those
powers;

ferent nations. When the Spartan exposed his sickly and deformed child, and when the savage put his aged parents to death, neither of them erred from want of sentiment, or from having sentiments originally different from ours. Their errors resulted from a defect in reasoning. They both imagined that they were obeying the law of benevolence by preventing misery: for a weak and deformed person was very ill qualified to exist with any degree of comfort under the military constitution of Sparta, where all were soldiers, and under the necessity of undergoing the greatest hardships; and in a state where the people have no fixed habitations, and where the chase supplies even the necessities of life, an aged and infirm person is in danger of perishing through hunger, by one of the cruellest and most lingering of deaths. The theft allowed in Sparta, if theft it may be called, was a still less deviation from the instinctive law of benevolence. Boys were taught to slip as cunningly as they could into the gardens and public halls, in order to steal away herbs or meat; and if they were caught in the fact, they were punished for their want of dexterity. This kind of theft, since it was authorised by the law and the consent of the citizens, was no robbery; and the intention of the legislator in allowing it, was to inspire the Spartan youth, who were all designed for war, with the greater boldness, subtlety, and address; to enure them sometimes to the life of a soldier; and to teach them to shift for themselves, and to live upon little. That the Spartan legislator did wrong in giving his countrymen a constitution, of which successful war was the ultimate object; and that savages, rather than kill their aged parents, or suffer them to die of hunger, ought to cultivate the ground; and abandon the chase, is readily granted: but the faults of the one as well as of the other arose not from any improper decision of the moral sense, but from a defect in their reasoning powers, which were not able to estimate the advantages and disadvantages of different modes of life. In moral decisions, therefore, conscience and reason are aiding to each other. The former principle, when separated from the latter, is defective, enjoining only the good of mankind, but unable to point out the means by which it can be most effectually promoted; and the latter principle, when separated from the former, only directs a man to do what is most prudent, but cannot give him a conception of duty.

32
Which are
different in
nature and
kind from
the passions
and affec-
tions.

These two powers of *reason* and *conscience* are evidently principles different in *nature* and *kind* from the passions and affections. For the passions are mere *force* or *power*, *blind impulses*, acting violently and without choice, and ultimately tending each to their respective objects, without regard to the interest of the others, or of the whole system. Whereas the *directing* and *judging* powers distinguish and ascertain the different forces, mutual proportions and relations, which the passions bear to each other and to the whole; recognise their several degrees of merit, and judge of the whole temper and conduct, as they respect either the individual or the species; and are capable of directing or restraining the blind impulses of passion in a due consistency one with the other, and a regular subordination to the whole system.

This is some account of the *constituent principles* of

our nature, which, according to their different mix-
tures, degrees, and proportions, mould our character
and sway our conduct in life. In reviewing that large
train of affections which fill up the different stages of
human life, we perceive this obvious distinction among
them; that some of them respect the *good* of the in-
dividual, and others carry us beyond ourselves to the
good of the *species* or *kind*. The former have therefore
been called *private*, and the latter *public* affections. Of
the first sort are *love of life*, of *pleasure*, of *power*, and
the like. Of the last are *compassion*, *gratitude*, *friendship*,
natural affection, and the like. Of the *private* pas-
sions (B), some respect merely the *security* and *defence*
of the creature, such as *resentment* and *fear*; whereas
others aim at some *positive* advantage or good, as *wealth*,
ease, *fame*. The former sort, therefore, because of this
difference of objects, may be termed *defensive* passions.
These answer to our *dangers*, and prompt us to avoid
them if we can, or boldly to encounter them when we
cannot.

The other class of *private* passions, which pursue
private positive good, may be called *appetitive*. How-
ever, we shall still retain the name of *private* in con-
tradistinction to the *defensive* passions. Man has a
great variety of wants to supply, and is capable of
many enjoyments, according to the several periods of
his life, and the different situations in which he is
placed. To these therefore a suitable train of *private*
passions correspond, which engage him in the pursuit
of whatever is necessary for his subsistence or welfare.

Our *public* or *social* affections are adapted to the se-
veral *social connections* and *relations* which we bear to
others, by making us sensible of their dangers, and in-
teresting us in their wants, and so prompting us to se-
cure them against one and supply the other.

This is the first step then to discover the *duty* and
destination of man, the having analysed the principles
of which he is composed. It is necessary, in the next
place, to consider in what *order*, *proportion*, and *measure*
of those inward principles, *virtue*, or a sound moral
temper and right conduct, consists; that we may dis-
cover whence *moral obligation* arises.

CHAP. II. Of DUTY, or MORAL OBLIGATION.

It is by the end or design of any power or move-
ment that we must direct its motions, and estimate the
degree of force necessary to its just action. If it want
the force requisite for the obtaining its end, we reckon
it defective; if it has too much, so as to be carried
beyond it, we say it is overcharged; and in either
case it is imperfect and ill-contrived. If it has just
enough to reach the scope, we esteem it right and
as it should be. Let us apply this reasoning to the
passions.

The *defence* and *security* of the individual being the
aim of the *defensive* passions, that *security* and *defence*
must be the *measure* of their *strength* or *indulgence*. If
they are so *weak* as to prove insufficient for that end,
or if they *carry us beyond it*, i. e. raise unnecessary com-
motions, or continue longer than is needful, they are
unfit to answer their original design, and therefore are
in an unsound and unnatural state. The exercise of
fear or of *resentment* has nothing desirable in it, nor
can

(B) Here we use passions and affections without distinction. Their difference will be marked afterwards.

Of Moral Obligation. can we give way to either without painful sensations. Without a certain degree of them, we are naked and exposed. With too high a proportion of them, we are miserable, and often injurious to others. Thus *cowardice* or *timidity*, which is the excess of fear, instead of saving us in danger, gives it too formidable an appearance, makes us incapable of attending to the best means of preservation, and disarms us of *courage*, our natural armour. *Fool-hardiness*, which is the want of a due measure of fear, leads us heedlessly into danger, and lulls us into a pernicious security. *Revenge*, i. e. *excessive resentment*, by the violence of its commotion, robs us of the *presence of mind* which is often the best guard against injury, and inclines us to pursue the aggressor with more severity than self-defence requires. *Pusillanimity*, or the want of a just indignation against wrong, leaves us quite unguarded, and tends to sink the mind into a passive enervated tameness. Therefore, "to keep the defensive passions duly proportioned to our dangers, is their natural pitch and tenor."

39 Measure of the private passions. The *private* passions lead us to pursue some *positive* species of *private* good: that good therefore which is the object and end of each must be the measure of their respective force, and direct their operation. If they are too *weak* or *sluggish* to engage us in the pursuit of their several objects, they are evidently *deficient*; but if they defeat their end by their *impetuosity*, then are they strained beyond the just tone of nature. Thus *vanity*, or an *excessive passion for applause*, betrays into such meannesses and little arts of popularity, as makes us forfeit the honour we so anxiously court. On the other hand, a *total indifference about the esteem of mankind*, removes a strong guard and spur to virtue, and lays the mind open to the most abandoned prosecutions. Therefore, "to keep our private passions and desires proportioned to our wants, is the just measure and pitch of this class of affections."

40 Comparative force. The *defensive* and *private* passions do all agree in general, in their tendency or conduciveness to the interest or good of the individual. Therefore, when there is a collision of interest, as may sometimes happen, that *aggregate of good or happiness*, which is composed of the particular goods to which they respectively tend, must be the common standard by which their *comparative degrees* of strength are to be measured: that is to say, if any of them, in the degree in which they prevail, are incompatible with the greatest aggregate of good or most extensive interest of the individual, then are they unequal and disproportionate. For in judging of a particular *system* or *constitution* of powers, we call that the *supreme* or *principal* end in which the aims of the several parts or powers coincide, and to which they are subordinate; and reckon them in due proportion to each other, and right with regard to the whole, when they maintain that subordination of subserviency. Therefore, "to proportion our defensive and private passions in such measure to our dangers and wants as best to secure the individual, and obtain the greatest aggregate of private good or happiness, is their just balance or comparative standard in case of competition."

41 Measure of the public affections. In like manner as the *public* or *social* affections point at the good of others, that good must be the measure of their force. When a particular *social* affection, as

gratitude or *friendship*, which belongs to a particular *social connection*, viz. that of a *benefactor* or of a *friend*, is too feeble to make us act the *grateful* or *friendly* part, that affection, being insufficient to answer its end, is *defective* and *unsound*. If, on the other hand, a particular passion of this class counteract or defeat the interest it is designed to promote, by its violence or disproportion, then is that passion *excessive* and *irregular*. Thus *natural affection*, if it degenerates into a *passionate fondness*, not only hinders the parents from judging coolly of the interest of their offspring, but often leads them into a most partial and pernicious indulgence.

42 Collision of social affections. As every kind affection points at the good of its particular object, it is possible there may be sometimes a collision of interests or goods. Thus the regard due to a *friend* may interfere with that which we owe to a *community*. In such a competition of interests, it is evident that the *greatest* is to be chosen; and that is the greatest interest which contains the greatest sum or aggregate of public good, greatest in *quantity* as well as *duration*. This then is the *common standard* by which the respective forces and subordinations of the social affections must be adjusted. Therefore we conclude, that "this class of affections are sound and regular when they prompt us to pursue the *interest* of *individuals* in an entire consistency with the *public good*;" or, in other words, "when they are duly proportioned to the *dangers* and *wants* of others, and to the various *relations* in which we stand to *individuals* or to *society*."

Thus we have found, by an induction of particulars, the *natural pitch* or *tenor* of the *different orders of affection*, considered apart by themselves. Now, as the *virtue* or *perfection* of every creature lies in following its nature, or acting suitably to the just proportion and harmony of its several powers; therefore, "the *VIR-TUE* of a creature endowed with such affections as *man* must consist in observing or acting agreeably to their *natural pitch and tenor*."

43 Balance of affection. But as there are no independent affections in the fabric of the mind, no passion that stands by itself, without some relation to the rest, we cannot pronounce of any one, considered APART, that it is either *too strong* or *too weak*. Its strength and just proportion must be measured not only by its subserviency to its own immediate end, but by the respect it bears to the whole system of affection. Therefore, we say a passion is *too strong*, not only when it defeats its own end, but when it impairs the force of other passions, which are equally necessary to form a *temper of mind* suited to a certain *economy* or *state*; and too weak, not merely on account of its insufficiency to answer its end, but because it cannot sustain its *part* or *office* in the balance of the whole system. Thus the *love of life* may be *too strong* when it takes from the *regard* due to one's country, and will not allow one bravely to encounter dangers, or even death, on its account. Again, the *love of fame* may be *too weak* when it throws down the fences which render virtue more secure, or weakens the incentives which make it more active and public-spirited.

44 Limits of private affections. If it be asked, "How far may the affections towards private good or happiness be indulged?" One limit was before fixed for the particular indulgence of each, viz. their subordination to the common aggregate of good to the private system. In these therefore a due regard

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Obligation.

regard is always supposed to be had to *health, reputation, fortune, the freedom of action, the unimpaired exercise of reason, the calm enjoyment of one's self*, which are all private goods. Another limit now results from the balance of affection just named, viz. "The security and happiness of others;" or, to express it more generally, "a *private* affection may be safely indulged, when, by that indulgence, we do not violate the obligations which result from our higher relations or public connections." A just respect therefore being had to these boundaries which nature has fixed in the breast of every man, what should limit our pursuits of private happiness? Is nature sullen and penurious? or, does the God of nature envy the happiness of his offspring?

45
Collision of
interests.

Whether there is ever a real collision of interests between the *public* and *private* system of affections, or the ends which each class has in view, will be afterwards considered; but where there is no collision, there is little or no danger of carrying either, but especially the *public* affections, to excess, provided both kinds are kept subordinate to a discreet and cool *self-love*, and to a calm and universal *benevolence*, which principles stand as guards at the head of each system.

46
Result.

This then is the conduct of the passions, considered as *particular* and *separate* forces, carrying us out to their respective ends; and this is their balance or *economy*, considered as *compound* powers, or powers mutually related, acting in conjunction towards a *common* end, and consequently as forming a *system* or *whole*.

47
Subordi-
nation of
powers.

Now, whatever adjusts or maintains this *balance*, whatever in the human constitution is formed for *directing* the passions so as to keep them from defeating their own end or interfering with each other, must be a principle of a *superior* nature to them, and ought to direct their measures and govern their proportions. But it was found that *reason* or reflection is such a principle, which points out the tendency of our passions, weighs their influence upon private and public happiness, and shows the best means of attaining either. It having been likewise found that there is another directing or controlling principle, which we call *CONSCIENCE* or the *MORAL SENSE*, which, by a native kind of authority, judges of affections and actions, pronouncing some *just* and *good*, and others *unjust* and *ill*; it follows, that the passions, which are mere impulse or blind forces, are principles inferior and subordinate to this *judging* faculty. Therefore, if we would follow the order of nature, *i. e.* observe the mutual respects and the subordination which the different parts of the human constitution bear one to another, the passions ought to be subjected to the direction and authority of the *leading* or *controlling* principles.

48
In what it
consists.

We conclude, therefore, from this *induction*, that "the *constitution* or *just economy* of human nature consists in a regular *subordination* of the *passions* and *affections* to the *authority* of *conscience* and the *direction* of *reason*."

49
Economy
of nature,
or tight
temper.

That *subordination* is *regular*, when the proportion formerly mentioned is maintained; that is to say, "when the *defensive* passions are kept proportioned to our *dangers*; when the *private* passions are proportioned to our *wants*; and when the *public* affections are adapted to our *public connections*, and proportioned to the wants and dangers of others."

But the *natural state*, or the *sound* and *vigorous con-*

stitution of any creature, or the *just economy* of its powers, we call its *health* and *perfection*; and the acting agreeably to these, its *virtue* or *goodness*. Therefore, "the *health* and *perfection* of man must lie in the afore-
said *supremacy* of *conscience* and *reason*, and in the *subordi-*
nation of the passions to their *authority* and *direction*. And his *virtue* or *goodness* must consist in acting agreeably to that *order* or *economy*."

Of Moral
Obligation.50
Human
virtue and
perfection.

That such an ornament of the mind, and such a conduct of its powers and passions, will stand the test of *reason*, cannot admit of any dispute. For, upon a fair examination into the consequences of things, or the relations and aptitudes of *means* to *ends*, *reason* evidently demonstrates, and *experience* confirms it, that, "to have our *defensive* passions duly proportioned to our *dangers*, is the surest way to avoid or get clear of them, and obtain the security we seek after.—To proportion our *private* passions to our *wants*, is the best means to supply them;—and, to adapt our *public* affections to our *social relations*, and the *good* of others, is the most effectual method of fulfilling *one*, and procuring the *other*." In this sense, therefore, *virtue* may be said to be a "*conduct* conformable to *reason*," as *reason* discovers an apparent *aptitude*, in such an *order* and *economy* of powers and passions, to answer the end for which they are *naturally* formed.

If the idea of *moral obligation* is to be deduced merely from this *aptitude* or *connection* between certain passions, or a certain order and balance of passions, and certain ends obtained or to be obtained by them, then is *reason* or *reflection*, which perceives that aptitude or connection, the proper judge of *moral obligation*; and on this supposition it may be defined, as hath been done by some, the connection between the *affection* and the *end*, or, which is the same thing, between the *action* and the *motive*; for the *end* is the *motive* or the *final cause*, and the *affection* is the *action*, or its immediate natural cause. A man, from mere *self-love*, may be induced to fulfil that obligation which is founded on the connection between the *defensive* passions and their *ends*, or the *private* passions and their *ends*; because in that case his own interest will prompt him to indulge them in the due proportion required. But if he has no affections which point beyond himself, no principle but *self-love*, or some subtle modification of it, what shall interest him in the happiness of others, where there is no connection between it and his own? or what sense can he have of *moral obligation* to promote it? Upon this scheme, therefore, without public or social affection there could be no *motive*, and consequently no *moral obligation*, to a beneficent disinterested conduct.

52
Connection
between af-
fections and
ends, not
the idea of
moral obli-
gation.

But if the mere connection between certain passions, or a certain order of passions and certain ends, are what constitutes or gives us the idea of *moral obligation*, then why may not the appositeness of any temper or conduct, nay, of any piece of machinery, to obtain its end, form an equally strict *moral obligation*? for the connection and aptitude are as strong and invariable in the latter instances as in the former. But as this is confounding the most obvious differences of things, we must trace the idea of *moral obligation* to another and a more natural source.

Let us appeal, therefore, to our inmost sense and experience, "how we stand affected to those different
sets
rience.

53

Of Moral Obligation. sets of passions, in the just measure and balance of which we found a right temper to consist." For this is entirely a matter of experience, in which we must examine, as in any other natural inquiry, "what are the genuine feelings and operations of nature, and what affections or symptoms of them appear in the given instance."

54
Why the defensive passions approved.

The defensive passions, as *anger* and *fear*, give us rather pain than pleasure, yet we cannot help feeling them when provoked by injury, or exposed to harm. We account the creature imperfect that wants them, because they are necessary to his defence. Nay, we should in some measure condemn ourselves, did we want the necessary degree of *resentment* and *caution*. But if our *resentment* exceeds the wrong received, or our *caution* the evil dreaded, we then blame ourselves for having over-acted our part. Therefore, while we are in danger, to be totally destitute of them we reckon a *blameable defect*, and to feel them in a just, *i. e.* necessary measure, we *approve*, as suited to the nature and condition of such a creature as man. But our security obtained, to continue to indulge them, we not only *disapprove* as *hurtful*, but *condemn* as *unmanly*, *unbecoming*, and *mean-spirited*: Nor will such a conduct afford any self-approving joy when we coolly reflect upon it.

55
Why the private.

With regard to the *private* passions, such as *love of life*, *pleasure*, *ease*, and the like, as these aim at private good, and are necessary to the perfection and happiness of the individual, we should reckon any creature *defective*, and even *blameable*, that was destitute of them. Thus, we condemn the man who imprudently ruins his fortune, impairs his health, or exposes his life; we not only pity him as an unfortunate creature, but feel a kind of *moral indignation* and contempt of him, for having made himself such. On the other hand, though a discreet self-regard does not attract our esteem and veneration, yet we approve of it in some degree, in an higher and different degree from what we would regard a well-contrived machine, as necessary to constitute a finished creature, nay, to complete the virtuous character, as exactly suited to our present indigent state. There are some passions respecting private good, towards which we feel higher degrees of approbation, as the *love of knowledge*, of *action*, of *honour*, and the like. We esteem them as marks of an ingenious mind; and cannot help thinking the character in which they are wanting remarkably stupid, and in some degree *immoral*.

56
Why the public.

With regard to the social affections, as *compassion*, *natural affection*, *friendship*, *benevolence*, and the like, we approve, admire, and love them in ourselves, and, in all in whom we discover them, with an esteem and approbation, if not different in kind, yet surely far superior in degree, to what we feel towards the other passions. These we reckon necessary; just, and excellently fitted to our structure and state; and the creature which wants them we call defective, ill-constituted, a kind of abortion. But the *public* affections we esteem as self-worthy, originally and eternally amiable.

57
Distinction between vehement and calm affections.

But among the *social* affections we make an obvious and constant distinction, viz. between those particular passions which urge us with a sudden violence, and uneasy kind of sensation, to pursue the good of their

respective objects, as *pity*, *natural affection*, and the like; and those calm dispassionate affections and desires which prompt us more steadily and uniformly to promote the happiness of others. The former we generally call *passions*, to distinguish them from the other sort, which go more commonly by the name of *affections*, or *calm desires*. The first kind we approve indeed, and delight in; but we feel still higher degrees of approbation and moral complacency towards the *last*, and towards all limitation of the particular instincts, by the principle of *universal benevolence*. The more objects the calm affections take in, and the worthier these are, their dignity rises in proportion; and with this our approbation keeps in exact pace. A character, on the other hand, which is quite divested of these public affections, which feels no love for the species, but instead of it entertains malice, rancour, and ill-will, we reckon totally immoral and unnatural.

Such then are the sentiments and dispositions we feel when these several orders of affection pass before the mental eye.

Therefore, "that state in which we feel ourselves moved, in the manner above described, towards those affections and passions, as they come under the mind's review, and in which we are, instantaneously and independently of our choice or volition, prompted to a correspondent conduct, we call a state of *moral obligation*." Let us suppose, for instance, a parent, a friend, a benefactor, reduced to a condition of the utmost indigence and distress, and that it is in our power to give them immediate relief. To what conduct are we *obliged*? what *duty* does nature dictate and require in such a case? Attend to nature, and nature will tell, with a voice irresistibly audible and commanding to the *human heart*, with an authority which no man can silence without being self-condemned, and which no man can elude but at his peril, "that immediate relief *ought* to be given." Again, let a friend, a neighbour, or even a stranger, have lodged a *deposit* in our hands, and after some time reclaim it; no sooner do these ideas of the confidence reposed in us, and of property not *transferred*, but *deposited*, occur, than we immediately and unavoidably feel and recognize the *obligation* to restore it. In both these cases we should condemn and even loathe ourselves if we acted otherwise, as having done, or omitted doing, what we *ought* not, as having acted beneath the dignity of our nature;—contrary to our most intimate sense of *right* and *wrong*:—we should accuse ourselves as guilty of ingratitude, injustice, and inhumanity,—and be conscious of deserving the censure, and therefore dread the resentment, of all rational beings.—But in complying with the *obligation*, we feel joy and self-approbation,—are conscious of an inviolable harmony between our nature and duty, and think ourselves intitled to the applause of every impartial spectator of our conduct.

To describe therefore what we cannot perhaps describe, a state of *moral obligation* is "that state in which a creature, endued with such senses, powers, and affections as man, would condemn himself, and think he deserved the condemnation of all others, should he refuse to fulfil it; but would approve himself, and expect the approbation of all others, upon complying with it."

And

Of Moral Obligation.

58
Moral obligation.

Of Moral
Obligation.

59
Moral a-
gent.

60
Moral ac-
tion good
and bad.

61
Moral cha-
racter and
temper
good and
bad.

62
How we
come by
the idea of
moral obli-
gation.

And we call him a MORAL AGENT, who is in such a *state*, or is subject to *moral obligation*. Therefore, as man's *structure* and *connections* often subject him to such a *state of moral obligation*, we conclude that he is a *moral agent*. But as man may sometimes act without *knowing* what he does, as in cases of *frenzy* or *disease*, or in many *natural functions*; or, knowing what he does, he may act without *choice* or *affection*, as in cases of *necessity* or *compulsion*; therefore to denominate an action *moral*, i. e. *approveable*, or *blameable*, it must be done *knowingly* and *willingly*, or *from affection* and *choice*. "A *morally good action*, then, is to fulfil a *moral obligation* knowingly and willingly." And a *morally bad action*, or an *immoral action*, is, "to violate a *moral obligation* knowingly and willingly."

As not an *action*, but a *series of actions*, constitute a *character*; as not an *affection*, but a *series of affections*, constitute a *temper*; and as we denominate things by the *gross*, *à fortiori*, or by the qualities which chiefly prevail in them; therefore we call that a "*morally good character*, in which a *series of morally good actions* prevail;" and that a "*morally good temper*, in which a *series of morally good affections* have the ascendant." A bad character and bad temper are the reverse. But where the above mentioned *order* or *proportion* of passions is maintained, there a *series of morally good affections and actions* will prevail. Therefore, "to maintain that order and proportion, is to have a *morally good temper and character*." But a "*morally good temper and character* is *moral rectitude, integrity, virtue, or the completion of duty*."

If it be asked, after all, "how we come by the idea of *moral obligation* or *duty*?" we may answer, That we come by it in the same way as by our other *original* and *primary* perceptions. We receive them all from nature, or the great Author of nature. For this idea of *moral obligation* is not a creature of the mind, or dependent on any previous act of volition; but arises on certain occasions, or when certain other ideas are presented to the mind, as necessarily, instantaneously, and unavoidably, as *pain* does upon too near an approach to the fire, or *pleasure* from the fruition of any good. It does not, for instance, depend on our choice, whether we shall feel the *obligation* to succour a distressed parent, or to restore a deposit intrusted to us when it is recalled. We cannot call this a *compound idea* made up of one or more simple ideas. We may indeed, nay we must, have some ideas antecedent to it, *e. g.* that of a parent—in distress—of a child—able to relieve—of the relation of one to the other—of a trust—of right, &c. But none of these ideas constitute the perception of *obligation*. This is an idea quite distinct from, and something superadded to, the ideas of the correlatives, or the relation subsisting between them. These indeed, by a law of our nature, are the occasion of suggesting it; but they are as totally different from it as colours are from sounds. By sense of reflection we perceive the correlatives; our memory recalls the favours or deposit we received; the various circumstances of the case are matters of fact or experience; but some delicate inward *organ* or *power*, or call it what we please, does, by a certain instantaneous sympathy, antecedent to the cool deductions of reason, and independent of previous instruction, art, or volition, *perceive*

the *moral harmony*, the *living, irresistible charms of moral obligation*, which immediately interests the correspondent passions, and prompts us to fulfil its lawful dictates.

We need not apprehend any danger from the quickness of its decisions, nor be frightened because it looks like *instinct*, and has been called so. Would we approve one for deliberating long, or reasoning the matter much at leisure, whether he should relieve a distressed parent, feed a starving neighbour, or restore the trust committed to him? should we not suspect the reasoner of knavery, or of very weak affections to virtue? We employ *reason*, and worthily employ it, in examining the condition, relations, and other circumstances of the agent or patient, or of those with whom either of them are connected, or, in other words, the *state of the case*; and in complicated cases, where the circumstances are many, it may require no small attention to find the true state of the case; but when the relations of the agent or patient, and the circumstances of the action are obvious, or come out such after a fair trial, we should scarce approve him who demurs on the obligation to that conduct which the case suggests.

From what has been said, it is evident, that it is not the pleasure or agreeable sensations which accompany the exercise of the several affections, nor those consequent to the actions, that constitute *moral obligation*, or excite in us the idea of it. That pleasure is posterior to the idea of obligation; and frequently we are obliged, and acknowledge ourselves under an obligation, to such affections and actions as are attended with pain; as in the trials of virtue, where we are obliged to sacrifice private to public good, or a present pleasure to a future interest. We have pleasure in serving an aged parent, but it is neither the perception nor prospect of that pleasure which gives us the idea of obligation to that conduct.

CHAP. III. The FINAL Causes of our moral Faculties of PERCEPTION and AFFECTION.

WE have now taken a general prospect of MAN and of his *moral powers* and *connections*, and on these erected a scheme of *duty*, or *moral obligation*, which seems to be confirmed by *experience*, consonant to *reason*, and approved by his most inward and most sacred *senses*. It may be proper in the next place to take a more particular view of the *final causes* of those delicate *springs* by which he is *impelled* to action, and of those *clogs* by which he is restrained from it. By this detail we shall be able to judge of their aptitude to answer their end, in a creature endued with his *capacities*, subject to his *wants*, exposed to his *dangers*, and susceptible of his *enjoyments*; and from thence we shall be in a condition to pronounce concerning the end of his *whole structure*, its *harmony* with its *state*, and consequently its subserviency to answer the great and benevolent intentions of its author.

The Supreme Being has seen fit to blend in the whole of things a prodigious variety of discordant and contrary principles, *light* and *darkness*, *pleasure* and *pain*, *good* and *evil*. There are multifarious natures, *higher* and *lower*, and many intermediate ones between the

Of Percep-
tion and
Affection.

63
The use of
reason in
moral cases.

64
Pleasure,
not the idea
of obliga-
tion.

65
The survey
proposed.

66
Inward an-
atomy of
the system
of the
wide-
mind.

Of Perception and Affection.

Of Perception and Affection.

wide-distant extremes. These are differently situated, variously adjusted, and subjected to each other, and all of them subordinate to the order and perfection of the whole. We may suppose *man* placed as in a centre amidst those innumerable orders of beings, by his *outward* frame drawing to the *material* system, and by his *inward* connected with the *INTELLECTUAL* or *moral*, and of course affected by the laws which govern both, or affected by that good and that ill which result from those laws. In this infinite variety of *relations* with which he is surrounded, and of *contingencies* to which he is liable, he feels strong attractions to the *good*, and violent repulsions or aversions to the *ill*. But as good and ill are often blended, and wonderfully complicated one with the other; as they sometimes immediately produce and run up into each other, and at other times lie at great distances, yet by means of intervening links introduce one another; and as these effects are often brought about in consequence of hidden relations and general laws, of the energy of which he is an incompetent judge; it is easy for him to mistake *good* for *evil*, and *evil* for *good*, and consequently he may be frequently attracted by such things as are destructive, or repel such as are salutary. Thus, by the tender and complicated frame of his body, he is subjected to a great variety of ills, to *sickness*, *cold*, *heat*, *fatigue*, and innumerable *wants*. Yet his knowledge is so narrow withal, and his reason so weak, that in many cases he cannot judge, in the way of investigation or reasoning, of the connections of those effects with their respective causes, or of the various latent energies of natural things.—He is therefore informed of this connection by the experience of certain *senses* or *organs* of *perception*, which, by a mechanical instantaneous motion, feel the *good* and the *ill*, receiving pleasure from *one*, and pain from the *other*. By these, without any reasoning, he is taught to attract or choose what tends to his welfare, and to repel and avoid what tends to his ruin. Thus, by his senses of *taste* and *smell*, or by the *pleasure* he receives from certain kinds of food, he is admonished which agree with his constitution; and by an opposite sense of *pain* he is informed which sort disagree, or are destructive of it; but is not by means of this instructed in the inward natures and constitutions of things.

67
Use of appetites and passions.

Some of those senses are armed with strong degrees of *uneasiness* or *pain*, in order to urge him to seek after such objects as are suited to them. And these respect his more immediate and pressing *wants*; as the sense of *hunger*, *thirst*, *cold*, and the like; which, by their painful importunities, compel him to provide *food*, *drink*, *raiment*, *shelter*. Those instincts by which we are thus prompted with some kind of commotion or violence to attract and pursue *good*, or to repel and avoid *ill*, we call *appetites* and *passions*. By our senses then we are informed of what is *good* or *ill* to the *private system*, or the *individual*; and by our *private appetites* and *passions* we are impelled to one, and restrained from the other.

68
Man's outward state.

In consequence of this machinery, and the great train of wants to which our nature subjects us, we are engaged in a continued series of occupations, which often require much application of thought, or great bodily labour, or both. The necessities of life, food,

cloaths, shelter, and the like, must be provided; conveniences must be acquired to render life still more easy and comfortable. In order to obtain these, arts, industry, manufactures, and trade, are necessary. And to secure to us the peaceable enjoyment of their fruits, civil government, policy, and laws, must be contrived, and the various business of public life carried on: thus, while man is concerned and busied in making provision, or obtaining security for himself, he is by degrees engaged in connections with a family; friends, neighbours, a community, or a commonwealth. Hence arise new wants, new interests, new cares, and new employments. The passions of one man interfere with those of another. Interests are opposed. Competitions arise, contrary courses are taken. Disappointments happen, distinctions are made, and parties formed. This opens a vast scene of distraction and embarrassment, and introduces a mighty train of good and ill, both public and private. Yet amidst all this confusion and hurry, plans of action must be laid, consequences foreseen or guarded against, inconveniences provided for; and frequently particular resolutions must be taken, and schemes executed, without reasoning or delay.

Now what provision has the Author of our nature made for this necessitous condition? how has he fitted the actor, man, for playing his part in this perplexed and busy scene?

69
Provisions for it.

Our supreme Parent, watchful for the whole, has not left himself without a witness here neither, and hath made nothing imperfect, but all things are double one against the other. He has not left man to be informed, only by the cool notices of reason, of the *good* or *ill*, the *happiness* or *misery* of his fellow-creatures — He has made him sensible of their good and happiness, but especially of their ill and misery, by an immediate sympathy, or quick feeling of *pleasure* and of *pain*.

70
By public senses and passions.

The latter we call *PITY* or *COMPASSION*. For the former, though every one, who is not quite divested of humanity, feels it in some degree, we have got not a name, unless we call it *CONGRATULATION* or *joyful SYMPATHY*, or that *good humour* which arises on seeing others pleased or happy. Both these feelings have been called in general the *PUBLIC* or *COMMON SENSE*, *κοινὴ νουμοσύνη*, by which we feel for others, and are interested in their concerns as really, though perhaps less sensibly than in our own.

71
Pity.

When we see our fellow-creatures unhappy through the fault or injury of others, we feel *resentment* or *indignation* against the *unjust* causers of that misery. If we are conscious that it has happened through our fault or *injurious* conduct, we feel *shame*; and both these classes of *senses* and *passions*, regarding *misery* and *wrong*, are armed with such sharp sensations of *pain*, as not only prove a powerful guard and security to the *species*, or *public system*, against those ills it may, but serve also to lessen or remove those ills it does, suffer. Compassion draws us out of ourselves to bear a part of the misfortunes of others, powerfully solicits us in their favour, melts us at the sight of their distress, and makes us in some degree unhappy till they are relieved from it. It is peculiarly well adapted to the condition of human life, because it is much more and oftener in our power to do mischief than good, and to prevent or lessen misery than to communicate positive

72
Congratulation.73
Resentment.

tive

Of Percep-
tion and
Affection.

74
Public af-
fections.

tive happiness; and therefore it is an admirable re-
straint upon the more *selfish* passions, or those violent
impulses that carry us to the hurt of others.

There are other particular *instincts* or *passions*
which interest us in the concerns of others, even while
we are most busy about our own, and which are
strongly attractive of *good*, and repulsive of *ill* to them.
Such are *natural affection*, *friendship*, *love*, *gratitude*,
desire of fame, *love of society*, of *one's country*, and
others that might be named. Now as the *private* ap-
petites and passions were found to be armed with
strong sensations of desire and uneasiness, to prompt
man the more effectually to sustain labours, and to en-
counter dangers in pursuit of those goods that are ne-
cessary to the preservation and welfare of the indivi-
dual, and to avoid those ills which tend to his destruc-
tion; in like manner it was necessary, that this *other*
class of desires and affections should be prompted with
as quick sensations of pain, not only to counteract the
strength of their antagonists, but to engage us in a
virtuous activity for our relations, families, friends,
neighbours, country. Indeed our *sense* of right and
wrong will admonish us that it is our *duty*, and *reason*
and *experience* farther assure us that it is both our in-
terest and best *security*, to promote the happiness of
others; but that *sense*, that *reason*, and that *experi-
ence*, would frequently prove but weak and ineffec-
tual prompters to such a conduct, especially in cases of
danger and hardship, and amidst all the importunities
of nature, and that constant hurry in which the *private*
passions involve us, without the aid of those particular
kind affections which mark out to us particular spheres
of duty, and with an agreeable violence engage and
fix us down to them.

75
Contrast or
balance of
passions.

* Vid. Hut-
cheson's
Conduct of
the Passions,
treat. I. § 2.

It is evident, therefore, that those two classes of
affection, the *private* and *public*, are set one against the
other, and designed to controul and limit each
other's influence, and thereby to produce a just balance
in the whole *. In general, the violent sensations of
pain and uneasiness which accompany hunger, thirst,
and the other private appetites, or too great fatigue
of mind as well as of body, prevent the individual
from running to great excesses in the exercise of the
higher functions of the mind, as too intense thought
in the search of truth, violent application to business
of any kind, and different degrees of romantic heroism.
On the other hand, the finer senses of *perception*, and
those *generous desires* and *affections* which are connected
with them, the *love of action*, of *imitation*, of *truth*,
honour, *public virtue*, and the like, are wisely placed
in the opposite scale, in order to prevent us from
sinking into the dregs of the *animal* life, and debasing
the dignity of man below the condition of brutes. So
that, by the mutual re-action of those opposite powers,
the bad effects are prevented that would naturally re-
sult from their acting singly and apart, and the good
effects are produced which each are severally formed
to produce.

76
Contrast or
balance of
public and
private pas-
sions.

The same wholesome opposition appears likewise
in the particular counter-workings of the *private* and
public affections one against the other. Thus *compas-
sion* is adapted to counterpoise the *love of ease*, of *plea-
sure*, and of *life*, and to disarm or to set bounds to *re-
sentment*; and *resentment* of injury done to ourselves,
or to our friends who are dearer than ourselves, pre-

N^o 228.

vents an effeminate *compassion* or *consolation*, and
gives us a noble contempt of labour, pain, and death.
Natural affection, *friendship*, *love of one's country*, nay,
zeal for any particular virtue, are frequently more
than a match for the whole train of *selfish* passions.
—On the other hand, without that intimate over-
ruling passion of *self-love*, and those private desires
which are connected with it, the *social* and *tender in-
stincts* of the human heart would degenerate into the
wildest dottage, the most torturing anxiety, and down-
right frenzy.

But not only are the different orders or classes of
affection checks one upon another, but passions of the
same classes are mutual clogs. Thus, how many are
with-held from the violent outrages of *resentment* by
fear? and how easily is *fear* controlled in its turn,
while mighty wrongs awaken a mighty *resentment*!
The *private* passions often interfere, and therefore
moderate the violence of each other; and a calm *self-
love* is placed at their head, to direct, influence, and
controul their particular attractions and repulsions.
The *public* affections likewise restrain one the other:
and all of them are put under the controul of a calm
dispassionate *benevolence*, which ought in like manner
to direct and limit their particular motions. Thus
most part, if not all the passions, have a twofold aspect,
and serve a twofold end. In *one* view they may be
considered as *powers*, impelling mankind to a certain
course, with a *force* proportioned to the *apprehended*
moment of the good they aim at. In *another* view
they appear as *weights*, balancing the action of the
powers, and controuling the violence of their impulses.
By means of these *powers* and *weights* a natural *poise*
is settled in the human breast by its all-wise Author,
by which the creature is kept tolerably steady and
regular in his course, amidst that variety of stages
through which he must pass.

But this is not all the provision which God has made
for the hurry and perplexity of the scene in which
man is destined to act. Amidst those infinite attrac-
tions and repulsions towards private and public good
and ill, mankind either cannot often foresee the *conse-
quences* or *tendencies* of all their actions towards one
or other of these, especially where those tendencies
are intricate and point different ways, or those conse-
quences remote and complicated; or though, by care-
ful and cool enquiry, and a due improvement of their
rational powers, they might find them out, yet, di-
stracted as they are with business, amused with trifles,
dissipated by pleasure, and disturbed by passion, they
either have or can find no leisure to attend to those
consequences, or to examine how far this or that con-
duct is productive of private or public good on the
whole. Therefore, were it left entirely to the slow
and sober deductions of reason to trace those tenden-
cies, and make out those consequences, it is evident,
that in many particular instances the business of life
must stand still, and many important occasions of ac-
tion be lost, or perhaps the grossest blunders be com-
mitted. On this account, the Deity, besides that ge-
neral approbation which we bestow on every degree
of *kind* affection, has moreover implanted in man
many particular *perceptions* or *determinations* to ap-
prove of certain *qualities* or *actions*, which, in effect,
tend to the advantage of society, and are connected

8

Of Percep-
tion and
Affection.

77
Contrasts
among
those of
the same
classes.

78
Particular
perceptions
or instincts
of approba-
tion.

Of Percep-
tion and
Affection.

with private good, though he does not always see that tendency, nor mind that connection. And these *perceptions* or *determinations* do without reasoning point out, and, antecedent to views of interest, prompt to a conduct beneficial to the *public*, and useful to the *private* system. Such is that *sense of candour and veracity*, that *abhorrence of fraud and falsehood*, that *sense of fidelity, justice, gratitude, greatness of mind, fortitude, clemency, decorum*; and that *disapprobation of knavery, injustice, ingratitude, meanness of spirit, cowardice, cruelty, and indecorum*, which are natural to the human mind. The former of those dispositions, and the actions flowing from them, are approved, and those of the latter kind disapproved by us, even abstracted from the view of their tendency or conduciveness to the happiness or misery of others, or of ourselves. In one we discern a *beauty*, a *superior excellency*, a congruity to the *dignity* of man; in the other a *deformity*, a *littleness*, a *debasement*, of human nature.

79
Others of
an inferior
order.

There are other principles also connected with the good of society, or the happiness and perfection of the individual, though that connection is not immediately apparent, which we behold with real complacency and approbation, though perhaps inferior in degree, if not in kind, such as *gravity, modesty, simplicity of deportment, temperance, prudent economy*; and we feel some degree of contempt and dislike where they are wanting, or where the opposite qualities prevail. These and the like *perceptions* or *feelings* are either different *modifications* of the *moral sense*, or *subordinate* to it, and plainly serve the same important purpose, being *expeditious monitors*, in the several emergencies of a various and distracted life, of what is *right*, what is *wrong*, what is to be *pursued*, and what *avoided*; and, by the pleasant or painful consciousness which attends them, exerting their influence as powerful *prompters* to a suitable conduct.

80
Their gene-
ral tenden-
cies.

From a slight inspection of the above-named principles, it is evident they all carry a friendly aspect to *society* and the *individual*, and have a more immediate or a more remote tendency to promote the *perfection* or *good* of both. This tendency cannot be always foreseen, and would be often mistaken or seldom attended to by a weak, busy, short-sighted creature like man, both rash and variable in his opinions, a dupe to his own passions, or to the designs of others, liable to sickness, to want, and to error. Principles, therefore, which are so nearly linked with *private security* and *public good*, by directing him, without operose reasoning, where to find *one*, and how to promote the *other*; and, by prompting him to a conduct conducive to both, are admirably adapted to the exigencies of his present state, and wisely calculated to obtain the ends of universal benevolence.

81
Passions fit-
ted to a
state of
trial;

It were easy, by considering the subject in another light, to show, in a curious detail of particulars, how wonderfully the inside of man, or that astonishing train of *moral powers* and *affections* with which he is endowed, is fitted to the several stages of that *progressive* and *probationary* state through which he is destined to pass. As our faculties are narrow and limited, and rise from very small and imperfect beginnings, they must be improved by exercise, by attention, and re-

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peated trials. And this holds true not only of our *intellectual*, but of our *moral* and *active* powers. The former are liable to errors in speculation, the latter to blunders in practice, and both often terminate in misfortunes and pains. And those errors and blunders are generally owing to our passions, or to our too forward and warm admiration of those partial goods they naturally pursue, or to our fear of those partial ills they naturally repel. Those misfortunes, therefore, lead us back to consider where our misconduct lay, and whence our errors flowed; and consequently are salutary pieces of trial, which tend to enlarge our views, to *correct* and *refine* our passions, and consequently improve both our *intellectual* and *moral* powers. Our passions then are the rude materials of our virtue, which Heaven has given us to work up, to refine and polish into an harmonious and divine piece of workmanship. They furnish out the whole machinery, the calms and storms, the lights and shades of human life. They show mankind in every attitude and variety of character, and give *virtue* both its struggles and its triumphs. To conduct them well in every state, is merit; to abuse or misapply them, is demerit.

The different sets of *senses, powers, and passions*, which unfold themselves in those successive stages, are both necessary and adapted to that *rising* and *progressive* state. Enlarging views and growing connections require new passions and new habits; and thus the mind, by these continually expanding and finding a progressive exercise, rises to higher improvements, and pushes forward to maturity and perfection.

In this beautiful economy and harmony of our structure, both outward and inward, with that state we may at once discern the great lines of our duty traced out in the fairest and brightest characters, and contemplate with admiration a more august and marvellous scene of divine wisdom and goodness laid in the human breast, than we shall perhaps find in the whole compass of nature.

From this detail it appears, that man, by his original frame, is made for a *temperate, compassionate, benevolent, active, and progressive* state. He is strongly *attractive* of the *good*, and *repulsive* of the *ills* which befall others as well as himself. He feels the highest *approbation* and *moral complacency* in those affections, and in those actions, which immediately and directly respect the *good* of others, and the highest *disapprobation* and *abhorrence* of the contrary. Besides these, he has many particular *perceptions* or *instincts* of *approbation*, which, though perhaps not of the same kind with the others, yet are accompanied with correspondent degrees of affection, proportioned to their respective tendencies to the *public good*. Therefore, by acting agreeably to these principles, man acts agreeably to his structure, and fulfils the benevolent intentions of its author. But we call a thing *good* when it answers its *end*, and a creature *good*, when he acts in a *conformity* to his *constitution*. Consequently, man must be denominated *good* or *virtuous* when he acts suitably to the *principles* and *destination* of his nature.

Of Percep-
tion and
Affection.

82
To a pro-
gressive
state.

83
Harmony
of our
structure
and state.

84
In what
economy
virtue con-
sists.

CHAP. I. *The principal Distinctions of DUTY
or VIRTUE.*

WE have now considered the constitution and connections of man, and on those erected a general system of duty or moral obligation, consonant to reason, approved by his most sacred and intimate sense, suitable to his mixed condition, and confirmed by the experience of mankind. We have also traced the final causes of his moral faculties and affections to those noble purposes they answer, with regard both to the private and the public system.

85
General di-
vision of
duty.

From this induction it is evident, that there is one order or class of duties which man owes to himself: another to society: and a third to God.

86
Duty to
one's self.

The duties he owes to himself are founded chiefly on the defensive and private passions, which prompt him to pursue whatever tends to private good or happiness, and to avoid or ward off whatever tends to private ill or misery. Among the various goods which allure and solicit him, and the various ills which attack or threaten him, "to be intelligent and accurate in selecting one, and rejecting the other, or in preferring the most excellent goods, and avoiding the most terrible ills, when there is a competition among either, and to be discreet in using the best means to attain the goods and avoid the ills, is what we call prudence." This, in our inward frame, corresponds to sagacity, or quickness of sense, in our outward.—"To proportion our defensive passions to our dangers, we call fortitude;" which always implies "a just mixture of calm resentment or animosity, and well-governed caution." And this firmness of mind answers to the strength and muscling of the body. And "duty to adjust our private passions to our wants, or to the respective moment of the good we affect or pursue, we call temperance;" which does therefore always imply, in this large sense of the word, "a just balance or command of the passions."

87
Duties to
society.

The second class of duties arises from the public or social affections, "the just harmony or proportion of which to the dangers and wants of others, and to the several relations we bear, commonly goes by the name of justice." This includes the whole of our duty to society, to our parents, and the general polity of nature; particularly gratitude, friendship, sincerity, natural affection, benevolence, and the other social virtues: This, being the noblest temper, and fairest complexion of the soul, corresponds to the beauty and fine proportion of the person. The virtues comprehended under the former class, especially prudence and fortitude, may likewise be transferred to this; and according to the various circumstances in which they are placed, and the more confined or more extensive sphere in which they operate, may be denominated private, economical, or civil prudence, fortitude, &c. These direct our conduct with regard to the wants and dangers of those lesser or greater circles with which they are connected.

The third class of duties respects the DEITY, and

arises from the public affections, and the several glorious relations which he sustains to us as our creator, benefactor, God. lawgiver, judge, &c.

We chose to consider this set of duties in the last place; because, though prior in dignity and excellency, they seem to be last in order of time, as thinking it the most simple and easy method to follow the gradual progress of nature, as it takes its rise from individuals, and spreads through the social system, and still ascends upwards, till at length it stretches to its almighty Parent and Head, and so terminates in those duties which are highest and best.

The duties resulting from these relations are, reverence, gratitude, love, resignation, dependence, obedience, worship, praise: which, according to the model of our finite capacities, must maintain some sort of proportion to the grandeur and perfection of the object whom we venerate, love, and obey. "This proportion or harmony is expressed by the general name of piety or devotion," which is always stronger or weaker according to the greater or less apprehended excellency of its object. This sublime principle of virtue is the enlivening soul which animates the moral system, and that cement which binds and sustains the other duties which man owes to himself or to society.

This then is the general temper and constitution of virtue, and these are the principal lines or divisions of duty. To those good dispositions which respect the several objects of our duty, and to all actions which flow from such dispositions, the mind gives its sanction or testimony. And this sanction or judgment concerning the moral quality, or the goodness of actions or dispositions, moralists call conscience. When it judges of an action that is to be performed, it is called an antecedent conscience; and when it passes sentence on an action which is performed, it is called a subsequent conscience. The tendency of an action to produce happiness, or its external conformity to a law, is termed its material goodness. But the good dispositions from which an action proceeds, or its conformity to law in every respect, constitutes its formal goodness.

When the mind is ignorant or uncertain about the moment of an action or its tendency to private or public good; or when there are several circumstances in the case, some of which, being doubtful, render the mind dubious concerning the morality of the action; this is called a doubtful or scrupulous conscience; if it mistakes concerning these, it is called an erroneous conscience. If the error or ignorance is involuntary or invincible, the action proceeding from that error, or from that ignorance, is reckoned innocent, or not imputable. If the error or ignorance is supine or affected, i. e. the effect of negligence, or of affectation and wilful inadvertence, the conduct flowing from such error, or such ignorance, is criminal and imputable.—Not to follow one's conscience, though erroneous and ill-informed, is criminal, as it is the guide of life; and to counteract it, shows a depraved and incorrigible spirit. Yet to follow an erroneous conscience is like-

88

Duties to
God.

89

Method.

90

Piety.

91

Conscience.

92

Its divisions

wife

Of Man's duty to Himself. **w**ise criminal, if that error which misled the conscience was the effect of inattention, or of any criminal passion *.

* Hutcheson.
Mor. Inst.
lib. 2. c. 3.

93
How conscience is to be rectified.

If it be asked, "How an erroneous conscience shall be rectified, since it is supposed to be the only guide of life, and judge of morals?" we answer, in the very same way that we would rectify reason if at any time it should judge wrong, as it often does, viz. by giving it proper and sufficient materials for judging right, i. e. by inquiring into the whole state of the case, the relations, connections, and several obligations of the actor, the consequences and other circumstances of the action, or the surplussage of private or public good which results, or is likely to result, from the action or from the omission of it. If those circumstances are fairly and fully stated, the conscience will be just and impartial in its decision: for, by a necessary law of our nature, it approves and is well affected to the *moral form*; and if it seems to approve of *vice* or *immorality*, it is always under the notion or mask of some *virtue*. So that, strictly speaking, it is not conscience which errs; for its sentence is always conformable to the view of the case which lies before it; and is *just*, upon the supposition that the case is truly such as it is represented to it. All the fault is to be imputed to the agent, who neglects to be better informed, or who, through weakness or wickedness, hastens to pass sentence from an imperfect evidence.

CHAP. II. Of Man's duty to HIMSELF. Of the Nature of GOOD, and the Chief GOOD.

94
Divisions of good.

EVERY creature, by the constitution of his nature, is determined to love himself; to pursue whatever tends to his preservation and happiness, and to avoid whatever tends to his hurt and misery. Being endued with sense and perception, he must necessarily receive *pleasure* from some objects, and *pain* from others. Those objects which give pleasure are called *good*; and those which give pain, *evil*. To the former he feels that attraction or motion we call *desire*, or *love*; to the latter, that impulse we call *aversion*, or *hatred*.—To objects which suggest neither pleasure nor pain, and are apprehended of no use to procure one or ward off the other, we feel neither *desire* nor *aversion*; and such objects are called *indifferent*. Those objects which do not of themselves produce pleasure or pain, but are the *means* of procuring either, we call *useful* or *noxious*. Towards them we are affected in a subordinate manner, or with an *indirect* and *reflective* rather than a *direct* and *immediate* affection. All the original and particular affections of our nature lead us out to and ultimately rest in the first kind of objects, viz. those which give immediate pleasure, and which we therefore call *good*, *directly so*. The "calm affection" of *self-love* alone is conversant about such objects as are only *consequentially good*, or merely useful to ourselves.

95
Moral good.

But, besides those sorts of objects which we call *good*, merely and solely as they give pleasure, or are means of procuring it, there is an higher and nobler species of good, towards which we feel that peculiar movement we call *approbation* or *moral complacency*; and which we therefore denominate *moral good*. Such are our affections, and the consequent actions to them.

The perception of this is, as has been already observed, quite distinct in kind from the perception of other species; and though it may be connected with *pleasure* or *advantage* by the benevolent constitution of nature, yet it constitutes a *good* independent of that pleasure and that advantage, and far superior not in degree only but in dignity to both. The *other*, viz. the *natural good*, consists in obtaining those pleasures which are adapted to the peculiar senses and passions susceptible of them, and is as various as are those senses and passions. This, viz. the *moral good*, lies in the right conduct of the several senses and passions, or their just proportion and accommodation to their respective objects and relations; and this is of a more simple and invariable kind.

By our several senses we are capable of a great variety of pleasing sensations. These constitute distinct ends or objects ultimately pursuable for their own sake. To these ends, or ultimate objects, correspond peculiar appetites or affections, which prompt the mind to pursue them. When these ends are attained, there it rests, and looks no farther. Whatever therefore is pursuable, not on its own account, but as subservient or necessary to the attainment of something else that is intrinsically valuable for its own sake, be that value ever so great or ever so small, we call a *mean*, and not an *end*. So that *ends* and *means* constitute the *materials* or the very *essence* of our *happiness*. Consequently happiness, i. e. *human happiness*, cannot be one simple uniform thing in creatures constituted, as we are, with such various senses of pleasure, or such different capacities of enjoyment. Now the same principle, or law of our nature, which determines us to pursue any one end or species of good, prompts us to pursue every other end or species of good of which we are susceptible, or to which our Maker has adapted an original propension. But, amidst the great multiplicity of *ends* or *goods* which form the various ingredients of our happiness, we perceive an evident *gradation* or *subordination* suited to that gradation of *senses*, *powers*, and *passions*, which prevails in our mixed and various constitution, and to that ascending series of connections which open upon us in the different stages of our progressive state.

Of Man's duty to Himself.

96

Human happiness.

Thus the goods of the *body*, or of the *external senses*, seem to hold the lowest rank in this gradation or scale of goods. These we have in common with the brutes; and though many men are brutish enough to pursue the goods of the body with a more than brutal fury, yet, when at any time they come in competition with goods of an higher order, the unanimous verdict of mankind, by giving the last the preference, condemns the first to the meanest place. Goods consisting in exterior social connections, as *fame*, *fortune*, *power*, *civil authority*, seem to succeed next, and are chiefly valuable as the means of procuring *natural* or *moral good*, but principally the latter. Goods of the *intellect* are still superior, as *taste*, *knowledge*, *memory*, *judgment*, &c. The highest are moral goods of the mind, directly and ultimately regarding ourselves, as *command of the appetites* and *passions*, *prudence*, *fortitude*, *benevolence*, &c. These are the great objects of our pursuit, and the principal ingredients of our happiness.

97
Gradation of goods.

Of man's
duty to
Himself.

98
Goods of
the body.

99
Good
health;

100
How pre-
served.

101
Strength,
agility, &c.

102
How at-
tained.

103
Patience of
change;

104
How at-
tained.

pinels. Let us consider each of them as they rise one above the other in this natural series or scale, and touch briefly on our obligations to pursue them.

Those of the body are *health, strength, agility, hardiness, and patience of change, neatness, and decency.*

Good health, and a regular easy flow of spirits, are in themselves sweet natural enjoyments, a great fund of pleasure, and indeed the proper seasoning which gives a flavour and poignancy to every other pleasure. The want of health unfits us for most duties of life, and is especially an enemy to the social and human affections, as it generally renders the unhappy sufferer peevish and fullen, disgusted at the allotments of Providence, and consequently apt to entertain suspicious and gloomy sentiments of its Author. It obstructs the free exercise and full improvement of our reason, makes us a burden to our friends, and useless to society. Whereas the uninterrupted enjoyment of good health is a constant source of good humour, and good humour is a great friend to openness and benignity of heart, enables us to encounter the various ills and disappointments of life with more courage, or to sustain them with more patience; and, in short, conduces much, if we are otherwise duly qualified, to our acting our part in every exigency of life with more firmness, consistency, and dignity. Therefore it imports us much to preserve and improve an habit or enjoyment, without which every other external entertainment is tasteless, and most other advantages of little avail.—And this is best done by a strict temperance in diet and regimen, by regular exercise, and by keeping the mind serene and unruffled by violent passions, and unsubdued by intense and constant labours, which greatly impair and gradually destroy the strongest constitutions.

Strength, agility, hardiness, and patience of change, suppose health, and are unattainable without it; but they imply something more, and are necessary to guard it, to give us the perfect use of life and limbs, and to secure us against many otherwise unavoidable ills.—The exercise of the necessary manual, and of most of the elegant arts of life, depends on strength and agility of body; personal dangers, private and public dangers, the demands of our friends, our families, and country, require them; they are necessary in war, and ornamental in peace; fit for the employment of a country and a town life, and they exalt the entertainments and diversions of both. They are chiefly obtained by moderate and regular exercise.

Few are so much raised above want and dependence, or so exempted from business and care, as not to be often exposed to inequalities and changes of diet, exercise, air, climate, and other irregularities. Now, what can be so effectual to secure one against the mischiefs arising from such unavoidable alterations, as hardiness, and a certain versatility of constitution which can bear extraordinary labours, and submit to great changes, without any sensible uneasiness or bad consequences. This is best attained, not by an over-great delicacy and minute attention to forms, or by an invariable regularity in diet, hours, and way of living, but rather by a bold and discreet latitude of regimen. Besides, deviations from established rules and forms of living, if kept within the bounds of sobriety and reason, are friendly to thought and original sentiments, animate

the dull scene of ordinary life and business, and agreeably stir the passions, which stagnate or breed ill-humour in the calms of life.

Neatness, cleanliness, and decency, to which we may add *dignity of countenance, and demeanour,* seem to have something refined and moral in them: at least we generally esteem them indications of an orderly, genteel, and well-governed mind, conscious of an inward worth, or the respect due to one's nature. Whereas *naughtiness, slovenliness, awkwardness, and indecency,* are shrewd symptoms of something mean, careless, and deficient, and betray a mind untaught, illiberal, unconscious of what is due to one's self or to others. How much cleanliness conduces to health, needs hardly to be mentioned; and how necessary it is to maintain one's character and rank in life, and to render us agreeable to others as well as to ourselves, is as evident.—There are certain motions, airs, and gestures, which become the human countenance and form, in which we perceive a *comeliness, openness, simplicity, gracefulness*; and there are others, which to our sense of decorum appear *uncomely, affected, dissingenuous, and awkward*, quite unsuitable to the native dignity of our face and form. The *first* are in themselves the most easy, natural, and commodious, give one boldness and presence of mind, a modest assurance, an address both awful and alluring; they bespeak candour and greatness of mind, raise the most agreeable prejudices in one's favour, render society engaging, command respect, and often love, and give weight and authority both in conversation and business; in fine, they are the colouring of virtue, which show it to the greatest advantage in whomsoever it is; and not only imitate, but in some measure supply it where it is wanting. Whereas the last, *viz. rudeness, affectation, indecorum, and the like,* have all the contrary effects; they are burdensome to one's self, a dishonour to our nature, and a nuisance in society. The former qualities or goods are best attained by a liberal education, by preserving a just sense of the dignity of our nature, by keeping the best and politest company, but, above all, by acquiring those virtuous and ennobling habits of mind which are decency in perfection, which will give an air of unaffected grandeur, and spread a lustre truly engaging over the whole form and deportment.

We are next to consider those goods which consist in exterior social connections, as *fame, fortune, civil authority, power.*

The first has a two-fold aspect, as a good pleasant in itself, or gratifying to an original passion, and then as expedient or useful towards a farther end. Honour from the wise and good, on the account of a virtuous conduct, is regaling to a good man; for then his heart re-echoes to the grateful sound. There are few quite indifferent even to the commendation of the vulgar. Though we cannot approve that conduct which proceeds entirely from this principle, and not from good affection or love of the conduct itself, yet, as it is often a guard and additional motive to virtue in creatures imperfect as we are, and often distracted by interfering passions, it might be dangerous to suppress it altogether, however wise it may be to restrain it within due bounds, and however laudable to use it only as a scaffolding to our virtue, which may be taken down when that glorious structure is finished, but hardly till then.

Of Man's
duty to
Himself.

105
Neatness,
decency,
&c.

106
How at-
tained.

107
Goods of
exterior so-
cial connec-
tions.

108
Fame.

Of Man's
duty to
Himself.

Of Man's
duty to
Himself.

112

Ambition.

then. To pursue fame for itself, is innocent; to regard it only as an auxiliary to virtue, is noble; to seek it chiefly as an engine of public usefulness, is still more noble, and highly praise-worthy. For though the opinion and breath of men are transient and fading things, often obtained without merit, and lost without cause; yet as our business is with men, and as our capacity of serving them is generally increased in proportion to their esteem of us, therefore sound and well-established moral applause may and will be modestly, not ostentatiously, sought after by the good; not indeed as a solitary refined sort of luxury, but as a public and proper instrument to serve and bless mankind. At the same time they will learn to despise that reputation which is founded on rank, fortune, and any other circumstances or accomplishments that are foreign to real merit, or to useful services done to others, and think that praise of little avail which is purchased without desert, and bestowed without judgment.

of power, which, after securing one's self, i. e. having attained the proper independence and liberty of a rational social creature, is not directed to the good of others, is what we call *ambition*, or the *lust of power*." To what extent the strict measures of virtue will allow us to pursue either wealth or power, and civil authority, is not perhaps possible precisely to determine. That must be left to prudence, and the peculiar character, condition, and other circumstances of each man. Only thus far a limit may be set, that the pursuit of either must encroach upon no other duty or obligation which we owe to ourselves, to society, or to its parent and head. The same reasoning is to be applied to *power* as to *wealth*. It is only valuable as an instrument of our own security, and of the free enjoyment of those original goods it may, and often does, administer to us, and as an engine of more extensive happiness to our friends, our country, and mankind.

109
Fortune,
power, &c.

Fortune, power, and civil authority, or whatever is called influence and weight among mankind, are goods of the *second* division, that is, valuable and pursuable only as they are *useful*, or as means to a farther end, viz. procuring or preserving the immediate objects of enjoyment or happiness to ourselves or others. Therefore to love such goods on their own account, and to pursue them as ends, not the means of enjoyment, must be highly preposterous and absurd. There can be no measure, no limit, to such pursuit; all must be whim, caprice, extravagance. Accordingly such appetites, unlike all the *natural* ones, are increased by possession, and whetted by enjoyment. They are always precarious, and never without fears, because the objects lie without one's self; they are seldom without sorrow and vexation, because no accession of wealth or power can satisfy them. But if those goods are considered only as the materials or means of private or public happiness, then the same obligations which bind us to pursue the latter, bind us likewise to pursue the former. We may, and no doubt we ought, to seek such a measure of wealth as is necessary to supply all our real wants, to raise us above servile dependence, and provide us with such conveniences as are suited to our rank and condition in life. To be regardless of this measure of wealth, is to expose ourselves to all the temptations of poverty and corruption; to forfeit our natural independency and freedom; to degrade, and consequently to render the rank we hold, and the character we sustain in society, useless, if not contemptible. When these important ends are secured, we ought not to murmur or repine that we possess no more; yet we are not secluded by any obligation, moral or divine, from seeking more, in order to give us that happiest and most god-like of all powers, the *power of doing good*. A supine indolence in this respect is both absurd and criminal; *absurd*, as it robs us of an inexhausted fund of the most refined and durable enjoyments; and *criminal*, as it renders us so far useless to the society to which we belong. "That pursuit of wealth which goes beyond the former end, viz. the obtaining the necessities, or such conveniences of life, as, in the estimation of reason, not of vanity or passion, are suited to our rank and condition, and yet is not directed to the latter, viz. the doing good, is what we call *avarice*." And "that pursuit

110
How far
pursuable.

111
Avarice.

Now the best, and indeed the only way to obtain a solid and lasting fame, is an uniform inflexible course of virtue, the employing one's ability and wealth in supplying the wants, and using one's power in promoting or securing the happiness, the rights and liberties of mankind, joined to an universal affability and politeness of manners. And surely one will not mistake the matter much, who thinks the same course conducive to the acquiring greater accessions both of wealth and power; especially if he adds to those qualifications a vigorous industry, a constant attention to the characters and wants of men, to the conjunctures of times, and continually-varying genius of affairs; and a steady intrepid honesty, that will neither yield to the allurements, nor be over-awed with the terrors, of that corrupt and corrupting scene in which we live. We have sometimes heard indeed of other ways and means, as fraud, dissimulation, servility, and prostitution, and the like ignoble arts, by which the men of the world (as they are called, shrewd politicians, and men of address!) amass wealth, and procure power; but as we want rather to form a man of virtue, an honest, contented, happy man, we leave to the men of the world their own ways, and permit them, unenvied and unimitated by us, to reap the fruit of their doings.

113

How fame
and power
are attain-
ed.

The next species of objects in the scale of good, are the goods of the *intellect*, as *knowledge, memory, judgment, taste, sagacity, docility*, and whatever else we call intellectual virtues. Let us consider them a little, and the means as well as obligations to improve them.

114

Goods of the
intellect.

As *man* is a *rational* creature, capable of knowing the differences of things and actions;—as he not only sees and feels what is present, but remembers what is past, and often foresees what is future;—as he advances from small beginnings by slow degrees, and with much labour and difficulty, to knowledge and experience;—as his opinions sway his passions,—as his passions influence his conduct,—and as his conduct draws consequences after it, which extend not only to the present but to the future time, and therefore is the principal source of his happiness or misery; it is evident, that he is formed for intellectual improvements, and that it must be of the utmost consequence for him to improve and cultivate his intellectual powers, on which those opinions, those passions, and that conduct depend*.

115

Their mo-
ment.

But besides the future consequences and moment of improving

* *Philos.
Sinc. Con-
fuc. lib. 1.
§ 3, 4, &c.*

Of Man's
duty to
Himself.

116

The plea-
sures they
give.

117

Knowledge
and taste;

improving our intellectual powers, their immediate exercise on their proper objects yields the most rational and refined pleasures. Knowledge, and a right taste in the arts of *imitation* and *design*, as *poetry*, *painting*, *sculpture*, *music*, *architecture*, afford not only an innocent, but a most sensible and sublime entertainment. By these the understanding is instructed in ancient and modern life, the history of men and things, the energies and effects of the passions, the consequences of virtue and vice; by these the imagination is at once entertained and nourished with the beauties of nature and art, lighted up and spread out with the novelty, grandeur, and harmony of the universe; and, in fine, the passions are agreeably roused, and suitably engaged, by the greatest and most interesting objects that can fill the human mind. He who has a taste formed to these ingenious delights, and plenty of materials to gratify it, can never want the most agreeable exercise and entertainment, nor once have reason to make that fashionable complaint of the tediousness of time. Nor can he want a proper subject for the discipline and improvement of his heart. For, being daily conversant with *beauty*, *order*, and *design*, in inferior subjects, he bids fair for growing in due time an admirer of what is fair and well-proportioned in the conduct of life and the order of society, which is only order and design exerted in their highest subject. He will learn to transfer the numbers of poetry to the harmony of the mind and of well-governed passions; and, from admiring the virtues of others in moral paintings, come to approve and imitate them himself. Therefore, to cultivate a *true* and *correct taste* must be both our interest and our duty, when the circumstances of our station give leisure and opportunity for it, and when the doing it is not inconsistent with our higher obligations or engagements to society and mankind.

118

How at-
tained.

It is best attained by reading the best books, where *good sense* has more the ascendant than *learning*, and which pertain more to *practice* than to *speculation*; by studying the best models, *i. e.* those which profess to imitate nature most, and approach the nearest to it, and by conversing with men of the most refined taste, and the greatest experience in life.

119

Other
intellectual
goods;

As to the other intellectual goods, what a fund of entertainment must it be to investigate the truth and various relations of things, to trace the operations of nature to general laws, to explain by these its manifold phenomena, to understand that order by which the universe is upheld, and that œconomy by which it is governed! to be acquainted with the human mind, the connections, subordinations, and uses of its powers, and to mark their energy in life! how agreeable to the ingenious inquirer, to observe the manifold relations and combinations of individual minds in society, to discern the causes why they flourish or decay, and from thence to ascend, through the vast scale of beings, to that general mind which presides over all, and operates unseen in every system and in every age, through the whole compass and progression of nature! Devoted to such entertainments as these, the contemplative have abandoned every other pleasure, retired from the body, so to speak, and sequestered themselves from social intercourse; for these, the *busy* have often preferred to the hurry and din of life the calm retreats of contemplation; for these, when once they came to

taste them, even the *gay* and *voluptuous* have thrown up the lawless pursuits of sense and appetite, and acknowledged these mental enjoyments to be the most *refined*, and indeed the *only* luxury. Besides, by a just and large knowledge of nature, we recognise the perfections of its author; and thus piety, and all those pious affections which depend on just sentiments of his character, are awakened and confirmed; and a thousand superstitious fears, that arise from partial views of his nature and works, will of course be excluded. An extensive prospect of human life, and of the periods and revolutions of human things, will conduce much to the giving a certain greatness of mind, and a noble contempt to those little competitions about power, honour, and wealth, which disturb and divide the bulk of mankind; and promote a calm endurance of those inconveniences and ills that are the common appendages of humanity. Add to all, that a just knowledge of human nature, and of those hinges upon which the business and fortunes of men turn, will prevent our thinking either too highly or too meanly of our fellow-creatures, give no small scope to the exercise of friendship, confidence, and good-will, and at the same time brace the mind with a proper caution and distrust (those nerves of prudence), and give a greater mastery in the conduct of private as well as public life. Therefore, by cultivating our intellectual abilities, we shall best promote and secure our interest, and be qualified for acting our part in society with more honour to ourselves, as well as advantage to mankind. Consequently, to improve them to the utmost of our power is our duty; they are talents committed to us by the Almighty Head of society, and we are accountable to him for the use of them.

120

How at-
tained.

The intellectual virtues are best improved by accurate and impartial observation, extensive reading, and unconfined converse with men of all characters, especially with those who, to private study, have joined the widest acquaintance with the world, and greatest practice in affairs; but, above all, by being much in the world, and having large dealings with mankind. Such opportunities contribute much to divest one of prejudices and a servile attachment to crude systems, to open one's views, and to give that experience on which the most useful because the most practical knowledge is built, and from which the surest maxims for the conduct of life are deduced.

121

Moral
goods.

The highest goods which enter into the composition of human happiness are *moral* goods of the mind, directly and ultimately regarding ourselves; as *command of the appetites and passions*, *prudence and caution*, *magnanimity*, *fortitude*, *humility*, *love of virtue*, *love of God*, *resignation*, and the like. These sublime goods are goods by way of eminence, goods recommended and enforced by the most intimate and awful sense and consciousness of our nature; goods that constitute the quintessence, the very temper of happiness, that form and complexion of soul which renders us approveable and lovely in the sight of God; goods, in fine, which are the elements of all our future perfection and felicity.

122

Their mo-
ment.

Most of the other goods we have considered depend partly on ourselves, and partly on accidents which we can neither foresee nor prevent, and result from causes which we cannot influence or alter. They are such goods as we may possess to-day and lose to-morrow, and

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duty to
Himself.

and which require a felicity of constitution, and talents to attain them in full vigour and perfection, and a felicity of conjunctures to secure the possession of them. Therefore, did our happiness depend altogether or chiefly on such transitory and precarious possessions, it were itself most precarious, and the highest folly to be anxious about it. — But though creatures, constituted as we are, cannot be indifferent about such goods, and must suffer in some degree, and consequently have our happiness incomplete without them, yet they weigh but little in the scale when compared with moral goods. By the benevolent constitution of our nature, these are placed within the sphere of our activity, so that no man can be destitute of them unless he is first wanting to himself. Some of the wisest and best of mankind have wanted most of the former goods, and all the external kind, and felt most of the opposite ills, such at least as arise from without; yet by possessing the latter, viz. the moral goods, have declared they were happy; and to the conviction of the most impartial observers have appeared happy. The worst of men have been surrounded with every outward good and advantage of fortune, and have possessed great parts; yet, for want of moral rectitude, have been, and have confessed themselves, notoriously and exquisitely miserable. The exercise of virtue has supported its votaries, and made them exult in the midst of tortures almost intolerable; nay, how often has some false form or shadow of it sustained even the greatest (D) villains and bigots under the same pressures! But no external goods, no goods of fortune, have been able to alleviate the agonies or expel the fears of a guilty mind, conscious of the deserved hatred and reproach of mankind, and the just displeasure of Almighty God.

123
The mixed
condition
of human
life requires
particular
virtues.

As the present condition of human life is wonderfully chequered with good and ill, and as no height of station, no affluence of fortune, can absolutely insure the good, or secure against the ill, it is evident that a great part of the comfort and serenity of life must lie in having our minds duly affected with regard to both, i. e. rightly attuned to the loss of one and the sufferance of the other. For it is certain that outward calamities derive their chief malignity and pressure from the inward dispositions with which we receive them. By managing these right, we may greatly abate that malignity and pressure, and consequently diminish the number, and weaken the moment, of the ills of life, if we should not have it in our power to obtain a large share of its goods. There are particularly three virtues which go to the forming this right temper towards ill, and which are of singular efficacy, if not totally to remove, yet wonderfully to alleviate, the calamities of life. These are *fortitude* or *patience*, *humility* and *resignation*.

124
Fortitude.

Fortitude is that calm and steady habit of mind which either moderates our fears, and enables us bravely to encounter the prospect of ill, or renders the mind serene and invincible under its immediate pressure. It lies equally distant from rashness and cowar-

dice: and though it does not hinder us from feeling, yet prevents our complaining or shrinking under the stroke. It always includes a generous contempt of, or at least a noble superiority to, those precarious goods of which we can insure neither the possession nor continuance. The man therefore who possesses this virtue in this ample sense of it, stands upon an eminence, and sees human things below him; the tempest indeed may reach him, but he stands secure and collected against it upon the basis of conscious virtue, which the severest storms can seldom shake, and never overthrow.

Humility is another virtue of high rank and dignity, though often mistaken by proud mortals for meanness and pusillanimity. It is opposed to *pride*, which commonly includes in it a false or over-rated estimation of our own merit, an ascription of it to ourselves as its only and original cause, an undue comparison of ourselves with others, and in consequence of that supposed superiority, an arrogant preference of ourselves, and a supercilious contempt of them. *Humility*, on the other hand, seems to denote that modest and ingenuous temper of mind, which arises from a just and equal estimate of our own advantages compared with those of others, and from a sense of our deriving all originally from the Author of our being. Its ordinary attendants are mildness, a gentle forbearance, and an easy unassuming humanity with regard to the imperfections and faults of others; virtues rare indeed, but of the fairest complexion, the proper offspring of so lovely a parent, the best ornaments of such imperfect creatures as we are, precious in the sight of God, and which sweetly allure the hearts of men.

Resignation is that mild and heroic temper of mind which arises from a sense of an infinitely wise and good providence, and enables one to acquiesce with a cordial affection in its just appointments. This virtue has something very particular in its nature, and sublime in its efficacy. For it teaches us to bear ill, not only with patience, and as being unavoidable, but it transforms, as it were, ill into good, by leading us to consider it, and every event that has the least appearance of ill, as a divine dispensation, a wise and benevolent temperament of things, subservient to universal good, and of course including that of every individual, especially of such as calmly stoop to it. In this light, the administration itself, nay every act of it, becomes an object of affection, the evil disappears, or is converted into a balm which both heals and nourisheth the mind. For though the first unexpected access of ill may surprise the soul into grief, yet that grief, when the mind calmly reviews its object, changes into contentment, and is by degrees exalted into veneration and a divine composure. Our private will is lost in that of the Almighty, and our security against every real ill rests on the same bottom as the throne of him who lives and reigns for ever.

Before we finish this section, it may be fit to observe, that as the Deity is the supreme and inexhausted source of good, on whom the happiness of the whole creation

Of Man's
duty to
Himself.

125
Humility.

126
Resignation.

127
Chief good,
objective
and formal.
creation

(D) As Ravilliac, who assassinated Henry IV. of France; and Balthasar Geraerd, who murdered William I. prince of Orange.

Of Man's
duty to
Himself.

creation depends; as he is the highest object in nature, and the only object who is fully proportioned to the intellectual and moral powers of the mind, in whom they ultimately rest, and find their most perfect exercise and completion; he is therefore termed the *Chief good of man*, objectively considered. And *virtue*, or the proportioned and vigorous exercise of the several powers and affections on their respective objects, as above described, is, in the schools, termed the *chief good*, formally considered, or its formal idea, being the inward temper and native constitution of human happiness.

From the detail we have gone through, the following corollaries may be deduced.

128
Corollaries.

First, It is evident, that the happiness of such a *progressive* creature as man can never be at a stand, or continue a fixed invariable thing. His finite nature, let it rise ever so high, admits still higher degrees of improvement and perfection. And his progression in improvement or virtue always makes way for a progression in happiness. So that no possible point can be assigned in any period of his existence in which he is perfectly happy, that is, so happy as to exclude higher degrees of happiness. All his perfection is only comparative. 2. It appears that many things must conspire to complete the happiness of so *various* a creature as man, subject to so many wants, and susceptible of such different pleasures. 3. As his capacities of pleasure cannot be all gratified at the same time, and must often interfere with each other in such a precarious and fleeting state as human life, or be frequently disappointed, perfect happiness, *i. e.* the undisturbed enjoyment of the several pleasures of which we are capable, is unattainable in our present state. 4. That state is most to be sought after, in which the fewest competitions and disappointments can happen, which least of all impairs any sense of pleasure, and opens an inexhausted source of the most refined and lasting enjoyments. 5. That state which is attended with all those advantages, is a state or course of virtue. 6. *Therefore*, a state of *virtue*, in which the moral goods of the mind are attained, is the *happiest state*.

CHAP. III. Duties of SOCIETY.

SECT. I. Filial and Fraternal Duty.

As we have followed the order of nature in tracing the history of man, and those duties which he owes to himself, it seems reasonable to take the same method with those he owes to society, which constitute the *second class* of his obligations.

129
Connection
of parents.

His parents are among the earliest objects of his attention; he becomes soonest acquainted with them, reposes a peculiar confidence in them, and seems to regard them with a fond affection, the early prognostics of his future *piety* and *gratitude*. Thus does nature dictate the first lines of filial duty, even before a just sense of the connection is formed. But when the child is grown up, and has attained to such a degree of understanding, as to comprehend the *moral tie*, and be sensible of the obligations he is under to his parents; when he looks back on their tender and disinterested affection, their incessant cares and labours in nursing, educating, and providing for him, during that state in which he had neither prudence nor strength to care

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and provide for himself, he must be conscious that he owes to them these peculiar duties.

1. To reverence and honour them, as the instruments of nature in introducing him to life, and to that state of comfort and happiness which he enjoys; and therefore to esteem and imitate their good qualities, to alleviate and bear with, and spread, as much as possible, a decent veil over their faults and weaknesses.

2. To be highly grateful to them, for those favours which it can hardly ever be in his power fully to repay; to show this gratitude by a strict attention to their wants, and a solicitous care to supply them; by a submissive deference to their authority and advice, especially by paying great regard to it in the choice of a wife, and of an occupation; by yielding to, rather than peevishly contending with, their humours, as remembering how oft they have been persecuted by his; and, in fine, by soothing their cares, lightening their sorrows, supporting the infirmities of age, and making the remainder of their life as comfortable and joyful as possible.

As his brethren and sisters are the next with whom the creature forms a *social* and *moral* connection, to them he owes a *fraternal* regard; and with them ought he to enter into a strict league of friendship, mutual sympathy, advice, assistance, and a generous intercourse of kind offices, remembering their relation to common parents, and that brotherhood of nature which unites them into a closer community of interest and affection.

SECT. II. Concerning Marriage.

WHEN man arrives to a certain age, he becomes sensible of a peculiar sympathy and tenderness towards the other sex; the charms of beauty engage his attention, and call forth new and softer dispositions than he has yet felt. The many amiable qualities exhibited by a fair outside, or by the mild allurements of female manners, or which the prejudiced spectator without much reasoning supposes those to include, with several other circumstances both natural and accidental, point his view and affection to a particular object, and of course contract that general rambling regard, which was lost and useless among the undistinguished crowd, into a peculiar and permanent attachment to one woman, which ordinarily terminates in the most important, venerable, and delightful connection in life.

The state of the brute creation is very different from that of human creatures. The former are clothed and generally armed by their structure, easily find what is necessary to their subsistence, and soon attain their vigour and maturity; so that they need the care and aid of their parents but for a short while; and therefore we see that nature has assigned to them vagrant and transient amours. The connection being purely *natural*, and merely for propagating and rearing their offspring, no sooner is that end answered, than the connection dissolves of course. But the human race are of a more tender and defenceless constitution; their infancy and non-age continue longer; they advance slowly to strength of body and maturity of reason; they need constant attention, and a long series of cares and labours, to train them up to decency, virtue, and the various arts of life. Nature has, there-

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Society.

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Duties to
parents.

131
Duties to
brethren
and sisters.

132
Connection
with the
other sex.

133
The
grounds of
this con-
nection.

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Society.Duties of
Society.

therefore, provided them with the most affectionate and anxious tutors, to aid their weakness, to supply their wants, and to accomplish them in those necessary arts, even their own parents, on whom she has devolved this mighty charge, rendered agreeable by the most alluring and powerful of all ties, parental affection. But unless both concur in this grateful task, and continue their joint labours, till they have reared up and planted out their young colony, it must become a prey to every rude invader, and the purpose of nature in the original union of the human pair be defeated. Therefore our structure as well as condition is an evident indication, that the human sexes are destined for a more intimate, for a moral and lasting union. It appears likewise, that the principal end of marriage is not to propagate and nurse up an offspring, but to educate and form minds for the great duties and extensive destinations of life. Society must be supplied from this original nursery with useful members, and its fairest ornaments and supports.

134
Moral ends
of marriage.

The mind is apt to be dissipated in its views and acts of friendship and humanity; unless the *former* be directed to a particular object, and the *latter* employed in a particular province. When men once indulge in this dissipation, there is no stopping their career; they grow insensible to moral attractions; and, by obstructing or impairing the decent and regular exercise of the tender and generous feelings of the human heart, they in time become unqualified for, or averse to, the forming a moral union of souls, which is the cement of society, and the source of the purest domestic joys. Whereas a rational, undepraved *love*, and its fair companion, *marriage*, collect a man's views, guide his heart to its proper object, and, by confining his affection to that object, do really enlarge its influence and use. Besides, it is but too evident from the conduct of mankind, that the common ties of humanity are too feeble to engage and interest the passions of the generality in the affairs of society. The connections of neighbourhood, acquaintance, and general intercourse, are too wide a field of action for many, and those of a *public* or *community* are so for more; and in which they *either care not, or know not how to* exert themselves. Therefore nature, ever wise and benevolent, by implanting that strong sympathy which reigns between the individuals of each sex, and by urging them to form a particular moral connection, the spring of many domestic endearments has measured out to each pair a particular *sphere of action*, proportioned to their views, and adapted to their respective capacities. Besides, by interesting them deeply in the concerns of their own little circle, she has connected them more closely with society, which is composed of particular families, and bound them down to their good behaviour in that particular community to which they belong. This *moral connection is marriage*, and this *sphere of action is a family*.

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Duties of
marriage.

Of the *conjugal* alliance the following are the *natural laws*. First, mutual fidelity to the marriage-bed. Disloyalty defeats the very end of marriage; dissolves the natural cement of the relation; weakens the moral tie, the chief strength of which lies in the reciprocity of affection; and, by making the offspring uncertain, diminishes the care and attachment necessary to their education.

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2. A conspiracy of counsels and endeavours to promote the common interest of the family, and to educate their common offspring. In order to observe these laws, it is necessary to cultivate, both before and during the married state, the strictest decency and chastity of manners, and a just sense of what becomes their respective characters.

3. The union must be inviolable, and for life. The nature of friendship, and particularly of this species of it, the education of their offspring, and the order of society and of successions, which would otherwise be extremely perplexed, do all seem to require it. To preserve this union, and render the matrimonial state more harmonious and comfortable, a mutual esteem and tenderness, a mutual deference and forbearance, a communication of advice, and assistance and authority, are absolutely necessary. If either party keep within their proper departments, there need be no disputes about power or superiority, and there will be none. They have no *opposite*, no *separate* interests, and therefore there can be no just ground for opposition of conduct.

From this detail, and the present state of things, in which there is pretty near a parity of numbers of both sexes, it is evident that *polygamy* is an *unnatural* state; and though it should be granted to be more fruitful of children, which however it is not found to be, yet it is by no means so fit for rearing minds, which seems to be as much, if not more, the intention of nature than the propagation of bodies.

136
Polygamy.

SECT. III. Of Parental Duty.

THE connection of parents with their children is a natural consequence of the matrimonial connection; and the duties which they owe them result as naturally from that connection. The feeble state of children, subject to so many wants and dangers, requires their incessant care and attention; their ignorant and uncultivated minds demand their continual instruction and culture. Had human creatures come into the world with the full strength of *men*, and the weakness of reason and vehemence of passions which prevail in *children*, they would have been too strong or too stubborn to have submitted to the government and instruction of their parents. But as they were designed for a progression in knowledge and virtue, it was proper that the growth of their bodies should keep pace with that of their minds, lest the purposes of that progression should have been defeated. Among other admirable purposes which this gradual expansion of their outward as well as inward structure serves, this is one, that it affords ample scope to the exercise of many tender and generous affections, which fill up the domestic life with a beautiful variety of duties and enjoyments; and are of course a noble discipline for the heart, and an hardy kind of education for the more honourable and important duties of *public* life.

137
Connection
of parents
and children.

The above mentioned weak and ignorant state of children seems plainly to invest their parents with such authority and power as is necessary to their support, protection, and education; but that authority and power can be construed to extend no farther than is necessary to answer those ends, and to last no longer than that weakness and ignorance continue; wherefore, the foundation or reason of the authority and

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The authority
founded
on that
connection.

P p

power

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Society.

power ceasing, they cease of course. Whatever power or authority then it may be necessary or lawful for parents to exercise during the non-age of their children, to assume or usurp the same when they have attained the maturity or full exercise of their strength and reason would be tyrannical and unjust. From hence it is evident, that parents have no right to punish the persons of their children more severely than the nature of their wardship requires, much less to invade their lives, to encroach upon their liberty, or transfer them as their property to any master whatsoever.

139
Duties of
parents.

The first class of duties which parents owe their children respect their natural life; and these comprehend protection, nurture, provision, introducing them into the world in a manner suitable to their rank and fortune, and the like.

140
Education.

The second order of duties regards the *intellectual* and *moral* life of their children, or their education in such arts and accomplishments as are necessary to qualify them for performing the duties they owe to themselves and to others. As this was found to be the principal design of the matrimonial alliance, so the fulfilling that design is the most important and dignified of all the parental duties. In order therefore to fit the child for acting his part wisely and worthily as a man, as a citizen, and a creature of God, both parents ought to combine their joint wisdom, authority, and power, and each apart to employ those talents which are the peculiar excellency and ornament of their respective sex. The father ought to lay out and superintend their education, the mother to execute and manage the detail of which she is capable. The former should direct the manly exertion of the intellectual and moral powers of his child. His imagination, and the manner of those exertions, are the peculiar province of the latter. The former should advise, protect, command, and, by his experience, masculine vigour, and that superior authority which is commonly ascribed to his sex, brace and strengthen his pupil for active life, for gravity, integrity, and firmness in suffering. The business of the latter is to bend and soften her male pupil, by the charms of her conversation, and the softness and decency of her manners, for social life, for politeness of taste, and the elegant decorums and enjoyments of humanity; and to improve and refine the tenderness and modesty of her female pupil, and form her to all those mild domestic virtues which are the peculiar characteristics and ornaments of her sex. To conduct the opening minds of their sweet charge through the several periods of their progress, to assist them in each period, in throwing out the latent seeds of reason and ingenuity, and in gaining fresh accessions of light and virtue; and at length, with all these advantages, to produce the young adventurers upon the great theatre of human life, to play their several parts in the sight of their friends, of society, and mankind!

SECT. IV. Herile and Servile Duty.

141
The ground
of this con-
nection.

In the natural course of human affairs, it must necessarily happen that some of mankind will live in plenty and opulence, and others be reduced to a state of indigence and poverty. The former need the labours of the latter and the latter provision and support of

the former. This mutual necessity is the foundation of that connection, whether we call it *moral* or *civil*, which subsists between masters and servants. He who feeds another has a right to some equivalent, the labour of him whom he maintains, and the fruits of it. And he who labours for another has a right to expect that he should support him. But as the labours of a man of ordinary strength are certainly of greater value than mere food and cloathing; because they would actually produce more, even the maintenance of a family, were the labourer to employ them in his own behalf; therefore he has an undoubted right to rate and dispose of his service for certain wages above mere maintenance; and if he has incautiously disposed of it for the latter only, yet the contract being of the *onerous* kind, he may equitably claim a supply of that deficiency. If the service be specified, the servant is bound to that only; if not, then he is to be construed as bound only to such services as are consistent with the laws of justice and humanity. By the voluntary servitude to which he subjects himself, he forfeits no rights but such as are necessarily included in that servitude, and is obnoxious to no punishment but such as a voluntary failure in the service may be supposed reasonably to require. *The offspring of such servants* have a right to that liberty which neither they nor their parents have forfeited.

As to those who, because of some heinous offense, or for some notorious damage, for which they cannot otherwise compensate, are condemned to perpetual service, they do not, on that account, forfeit all the rights of men; but those, the loss of which is necessary to secure society against the like offences for the future, or to repair the damage they have done.

With regard to captives taken in war, it is barbarous and inhuman to make perpetual slaves of them, unless some peculiar and aggravated circumstances of guilt have attended their hostility. The bulk of the subjects of any government engaged in war may be fairly esteemed innocent enemies; and therefore they have a right to that clemency which is consistent with the common safety of mankind, and the particular security of that society against which they are engaged. Though ordinary captives have a grant of their lives, yet to pay their liberty as an equivalent is much too high a price. There are other ways of acknowledging or returning the favour, than by surrendering what is far dearer than life itself*. To those who, under pretext of the necessities of commerce, drive the unnatural trade of bargaining for human flesh, and consigning their innocent but unfortunate fellow creatures to eternal servitude and misery, we may address the words of a fine writer; "Let avarice defend it as it will, there is an honest reluctance in humanity against buying and selling, and regarding those of our own species as our wealth and possessions."

SECT. V. Social Duties of the private Kind.

HITHERTO we have considered only the *domestic* *economical* duties, because these are first in the progress of nature. But as man passes beyond the little circle of a family, he forms connections with relations, friends, neighbours, and others; from whence results

Duties of
Society.

142
The condi-
tions of ser-
vice.

143
The case of
great offen-
ders.

144
The case of
captives.

*Hutches.
Mor. Inq.
Phil. lib. 3.

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Society.145
Man's apti-
tude for so-
ciety.

a new train of duties of the more private social kind, as "friendship, chastity, courtesy, good-neighbourhood, charity, forgiveness, hospitality."

Man is admirably formed for particular social attachments and duties. There is a peculiar and strong propensity in his nature to be affected with the sentiments and dispositions of others. Men, like certain musical instruments, are set to each other, so that the vibrations or notes excited in one raise correspondent notes and vibrations in the others. The impulses of *pleasure* or *pain*, *joy* or *sorrow*, made on one mind, are by an instantaneous sympathy of nature communicated in some degree to all; especially when hearts are (as an humane writer expresses it) in *unison* of kindness; the joy that vibrates in one communicates to the other also. We may add, that though joy thus imparted swells the harmony, yet grief vibrated to the heart of a friend, and rebounding from thence in sympathetic notes, melts as it were, and almost dies away. All the passions, but especially those of the social kind, are contagious; and when the passions of one man mingle with those of another, they increase and multiply prodigiously. There is a most moving eloquence in the human countenance, air, voice, and gesture, wonderfully expressive of the most latent feelings and passions of the soul, which darts them like a subtle flame into the hearts of others, and raises correspondent feelings there: friendship, love, good-humour, joy, spread through every feature, and particularly shoot from the eyes their softer and fiercer fires with an irresistible energy. And in like manner the opposite passions of hatred, enmity, ill-humour, melancholy, diffuse a fullen and saddening air over the face, and, flashing from eye to eye, kindle a train of similar passions. By these, and other admirable pieces of machinery, men are formed for society and the delightful interchange of friendly sentiments and duties, to increase the happiness of others by participation, and their own by rebound; and to diminish, by dividing, the common stock of their misery.

146
Duties arising from
private relation.

The first emanations of the *social* principle beyond the bounds of a family lead us to form a nearer conjunction of friendship or good-will with those who are any wise connected with us by *blood* or *domestic alliance*. To them our affection does commonly exert itself in a greater or less degree, according to the nearness or distance of the relation. And this proportion is admirably suited to the extent of our powers and the indigence of our state; for it is only within those lesser circles of consanguinity or alliance that the generality of mankind are able to display their abilities or benevolence, and consequently to uphold their connection with society and subserviency, to a public interest. Therefore it is our duty to regard these closer connections as the next department to that of a family, in which nature has marked out for us a sphere of activity and usefulness; and to cultivate the kind affections which are the cement of those endearing alliances.

147
Ingredients
of friend-
ship.

Frequently the view of distinguishing moral qualities in some of our acquaintance may give birth to that more noble connection we call *FRIENDSHIP*, which is far superior to the alliances of consanguinity. For these are of a superficial, and often of a transitory nature, of which, as they hold more of *instinct*

than of *reason*, we cannot give such a rational account. But *friendship* derives all its strength and beauty, and the only existence which is durable, from the qualities of the heart, or from virtuous and lovely dispositions. Or, should these be wanting, they or some shadow of them must be supposed present.— Therefore *friendship* may be described to be, "The union of two souls by means of *virtue*, the common object and cement of their mutual affection." Without virtue, or the supposition of it, friendship is only a *mercenary* league, an alliance of interest, which must dissolve of course when that interest decays or subsists no longer. It is not so much any particular passion, as a composition of some of the noblest feelings and passions of the mind. *Good sense*, a *just taste* and *love of virtue*, a *thorough candour* and *benignity of heart*, or what we usually call a *good temper*, and a generous sympathy of sentiments and affections, are the necessary ingredients of this virtuous connection. When it is grafted on esteem strengthened by habit, and mellowed by time, it yields infinite pleasure, ever new and ever growing; is a noble support amidst the various trials and vicissitudes of life, and an high seasoning to most of our other enjoyments.— To form and cultivate virtuous friendship, must be very improving to the temper, as its principal object is *virtue*, set off with all the allurements of countenance, air, and manners, shining forth in the native graces of manly honest sentiments and affections, and rendered *visible* as it were to the friendly spectator in a conduct unaffectedly great and good; and as its principal exercises are the very energies of virtue, or its effect and emanations. So that wherever this amiable attachment prevails, it will exalt our admiration and attachment to virtue, and, unless impeded in its course by unnatural prejudices, run out into a friendship to the human race. For as no one can merit, and none ought to usurp, the sacred name of friend, who hates mankind; so whoever truly loves *them*, possesses the most essential quality of a true friend.

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Society.148
Its duties.

The duties of friendship are a mutual esteem of each other, unbribed by interest, and independent of it, a generous confidence as far distant from suspicion as from reserve, an inviolable harmony of sentiments and dispositions of designs and interests, a fidelity unshaken by the changes of fortune, a constancy unalterable by distance of time or place, a resignation of one's personal interest to those of one's friend, and a reciprocal, unenvious, unreserved exchange of kind offices.— But, amidst all the exertions of this moral connection, humane and generous as it is, we must remember that it operates within a narrow sphere, and its immediate operations respect only the individual; and therefore its particular impulses must still be subordinate to a more public interest, or be always directed and controlled by the more extensive connections of our nature.

When our friendship terminates on any of the other *Love and* sex, in whom beauty or agreeableness of person and chastity. external gracefulness of manners conspire to express and heighten the moral charm of a tender honest heart, and sweet, ingenuous, modest temper, lighted up by good sense; it generally grows into a more soft and endearing attachment. When this attachment is im-

Duties of
Society.† See Sect.
ii. of this
chapter.

proved by a growing acquaintance with the worth of its object, is conducted by discretion, and issues at length, as it ought to do, in the moral connection formerly mentioned †, it becomes the source of many amiable duties, of a communication of passions and interests, of the most refined decencies, and of a thousand nameless deep-felt joys of reciprocal tenderness and love, flowing from every look, word, and action. Here friendship acts with double energy, and the *natural* conspires with the *moral* charms to strengthen and secure the love of virtue. As the delicate nature of female honour and decorum, and the inexpressible grace of a chaste and modest behaviour, are the surest and indeed the only means of kindling at first, and ever after of keeping alive, this tender and elegant flame, and of accomplishing the excellent ends designed by it; to attempt by fraud to violate one, or, under pretence of passion, to sully and corrupt the other, and, by so doing, to expose the too often credulous and unguarded object, with a wanton cruelty, to the hatred of her own sex and the scorn of ours, and to the lowest infamy of both, is a conduct not only base and criminal, but inconsistent with that truly rational and refined enjoyment, the spirit and quintessence of which is derived from the bashful and sacred charms of virtue kept untainted, and therefore ever alluring to the lover's heart.

150
Courtesy,
good-
neighbour-
hood, &c.

Courtesy, good-neighbourhood, affability, and the like duties, which are founded on our private social connections, are no less necessary and obligatory to creatures united in society, and supporting and supported by each other in a chain of mutual want and dependence. They do not consist in a smooth address, an artificial or obsequious air, fawning adulations, or a polite servility of manners; but in a just and modest sense of our own dignity and that of others, and of the reverence due to mankind, especially to those who hold the higher links of the social chain; in a discreet and manly accommodation of ourselves to the foibles and humours of others; in a strict observance of the rules of decorum and civility; but, above all, in a frank obliging carriage, and generous interchange of good deeds rather than words. Such a conduct is of great use and advantage, as it is an excellent security against injury, and the best claim and recommendation to the esteem, civility, and universal respect of mankind. This inferior order of virtues unite the particular members of society more closely, and forms the lesser pillars of the civil fabric; which, in many instances, supply the unavoidable defects of laws, and maintain the harmony and decorum of social intercourse, where the more important and essential lines of virtue are wanting.

151
Charity,
forgiveness.

Charity and forgiveness are truly amiable and useful duties of the social kind. There is a twofold distinction of rights commonly taken notice of by moral writers, viz. *perfect* and *imperfect*. To fulfil the former, is necessary to the being and support of society; to fulfil the latter, is a duty equally sacred and obligatory, and tends to the improvement and prosperity of society; but as the violation of them is not equally prejudicial to the public good, the fulfilling them is not subjected to the cognizance of law, but left to the candour, humanity, and gratitude of individuals. And by

this means ample scope is given to exercise all the generosity, and display the genuine merit and lustre, of virtue. Thus the wants and misfortunes of others call for our charitable assistance and seasonable supplies. And the good man, unconstrained by law, and uncontrouled by human authority, will cheerfully acknowledge and generously satisfy this mournful and moving claim; a claim supported by the sanction of heaven, of whose bounties he is honoured to be the grateful trustee. If his own *perfect* rights are invaded by the injustice of others, he will not therefore reject their *imperfect* right to pity and forgiveness, unless his grant of these should be inconsistent with the more extensive rights of society, or the public good. In that case he will have recourse to public justice and the laws, and even then he will prosecute the injury with no unnecessary severity, but rather with mildness and humanity. When the injury is merely personal, and of such a nature as to admit of alleviations, and the forgiveness of which would be attended with no worse consequences, especially of a public kind, the good man will generously forgive his offending brother. And it is his duty to do so, and not to take private revenge, or retaliate evil for evil. For though resentment of injury is a natural passion, and implanted, as was observed * above, for wise and good ends; yet, considering the manifold partialities which most men have for themselves, was every one to act as judge in his own cause, and to execute the sentence dictated by his own resentment, it is but too evident that mankind would pass all bounds in their fury, and the last sufferer be provoked in his turn to make full reprisals. So that evil, thus encountering with evil, would produce one continued series of violence and misery, and render society intolerable, if not impracticable. Therefore, where the security of the individual, or the good of the public, does not require a proportionable retaliation, it is agreeable to the general law of benevolence, and to the particular end of the passion (which is to prevent injury and the misery occasioned by it), to forgive personal injuries, or not to return evil for evil. This duty is one of the noble refinements which *Christianity* has made upon the general maxims and practice of mankind, and enforced, with a peculiar strength and beauty, by sanctions no less alluring than awful. And indeed the practice of it is generally its own reward; by expelling from the mind the most dreadful intruders upon its repose, those rancorous passions which are begot and nursed by resentment, and by disarming and even subduing every enemy one has, except such as have nothing left of men but the outward form.

The most enlarged and humane connection of the private kind seems to be the hospitable alliance, from which flow the amiable and disinterested duties we owe to strangers. If the exercise of passions of the most private and instinctive kind is beheld with moral approbation and delight, how lovely and venerable must those appear which result from a calm philanthropy, are founded in the common rights and connections of society, and embrace men, not of a particular sect, party, or nation, but all in general without distinction, and without any of the little partialities of self-love.

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Society.* See Part II.
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and iv.152
Hospitals.

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Society.SECT. VI. *Social duties of the COMMERCIAL kind.*153
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cial duties.154
Their foun-
dation.

THE next order of connections are those which arise from the wants and weakness of mankind, and from the various circumstances in which their different situations place them. These we may call *commercial* connections, and the duties which result from them *commercial* duties, as *justice*, *fair-dealing*, *sincerity*, *fidelity to compacts*, and the like.

Though nature is perfect in all her works, yet she has observed a manifest and eminent distinction among them. To all such as lie beyond the reach of human skill and power, and are properly of her own department, she has given the finishing hand. These man may design after and imitate, but he can never rival them, nor add to their beauty or perfection. Such are the forms and structure of vegetables, animals, and many of their productions, as the honey-comb, the spider's web, and the like. There are others of her works which she has of design left unfinished, as it were, in order to exercise the ingenuity and power of man. She has presented to him a rich profusion of materials of every kind for his convenience and use; but they are rude and unpolished, or not to be come at without art and labour. These therefore he must apply, in order to adapt them to his use, and to enjoy them in perfection. Thus nature has given him an infinite variety of herbs, grain, fossils, minerals, wood, water, earth, air, and a thousand other crude materials, to supply his numerous wants. But he must sow, plant, dig, refine, polish, build, and, in short, manufacture the various produce of nature, in order to obtain even the necessaries, and much more the conveniences and elegancies of life. These then are the price of his labour and industry, and, without that, nature will sell him nothing. But as the wants of mankind are many, and the single strength of individuals small, they could hardly find the necessaries, and much less the conveniences of life, without uniting their ingenuity and strength in acquiring these, and without a mutual intercourse of good offices. Some men are better formed for some kinds of ingenuity and labour, and others for other kinds; and different soils and climates are enriched with different productions; so that men, by exchanging the produce of their respective labours, and supplying the wants of one country with the superfluities of another, do in effect diminish the labours of each, and increase the abundance of all. This is the foundation of all commerce, or exchange of commodities and goods, one with another; in order to facilitate which, men have contrived different species of coin, or money, as a common standard by which to estimate the comparative values of their respective goods. But to render commerce sure and effectual, *justice*, *fair-dealing*, *sincerity*, and *fidelity to compacts*, are absolutely necessary.

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Justice;

Justice or *fair dealing*, or, in other words, a disposition to treat others as we would be treated by them, is a virtue of the first importance, and inseparable from the virtuous character. It is the cement of society, or that pervading spirit which connects its members, inspires its various relations, and maintains the order and subordination of each part to the whole. Without it, society would become a den of thieves and

banditti, hating and hated, devouring and devoured, by one another.

And here it may be proper to take a view of Mr Hume's supposed case of the sensible knave and the worthless miser (n^o 16.), and consider what would be the duty of the former according to the theory of those moralists who hold the *will of God* to be the *criterion* or rule, and *everlasting happiness* the motive, of human virtue.

It has been already observed, and the truth of the observation cannot be controverted, that, by secretly purloining from the coffers of a miser part of that gold which there lies useless, a man might, in particular circumstances, promote the good of society, without doing any injury to a single individual: and it was hence inferred, that, in such circumstances, it would be no duty to abstain from theft, were *local utility* arising from *particular consequences* the real criterion or standard of justice. Very different, however, is the conclusion which must be drawn by those who consider the natural tendency of actions, if universally performed, as the criterion of their merit or demerit in the sight of God. Such philosophers attend, not to the particular consequences of a single action in any given case, but to the general consequences of the principle from which it flows, if that principle were universally adopted. You cannot (say they) permit one action and forbid another, without showing a difference between them. The same sort of actions, therefore, must be generally permitted or generally forbidden. But were every man allowed to ascertain for himself the circumstances in which the good of society would be promoted, by secretly abstracting the superfluous wealth of a worthless miser, it is plain that no property could be secure; that all incitements to industry would be at once removed; and that, whatever might be the *immediate* consequences of any *particular theft*, the *general* and *necessary* consequences of the *principle* by which it was authorized must soon prove fatal. Were one man to purloin part of the riches of a real miser, and to consider his conduct as vindicated by his intention to employ those riches in acts of generosity, another might by the same sort of casuistry think himself authorized to appropriate to himself part of his wealth; and thus theft would spread through all orders of men, till society were dissolved into separate, hostile, and savage families, mutually dreading and shunning each other. The general consequences, therefore, of encroaching upon private property tend evidently and violently to universal misery.

On the other hand, indeed, the particular and immediate consequences of that principle which considers every man's property as sacred, may in some cases, such as that supposed, be in a small degree injurious to a few families in the neighbourhood of the miser and the knave. But that injury can never be of long duration; and it is infinitely more than counterbalanced by the general good consequences of the principle from which it accidentally results; for these consequences extend to all nations and to all ages. Without a sacred regard to property, there could neither be arts nor industry nor confidence among men, and happiness would be for ever banished from this world. But the communication of happiness being the end which

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which God had in view when he created the world, and all men standing in the same relation to him, it is impossible to suppose that he does not approve, and will not ultimately reward, those voluntary actions of which the natural tendency is to increase the sum of human happiness; or that he does not disapprove, and will not ultimately punish, those which naturally tend to aggravate human misery. The conclusion is, that a strict adherence to the principle of justice is universally, and in all possible circumstances, a duty from which we cannot deviate without offending our Creator, and ultimately bringing misery upon ourselves.

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Sincerity.

Sincerity, or *veracity*, in our words and actions, is another virtue or duty of great importance to society, being one of the great bands of mutual intercourse, and the foundation of mutual trust. Without it, society would be the dominion of mistrust, jealousy, and fraud, and conversation a traffic of lies and dissimulation. It includes in it a conformity of our words with our sentiments, a correspondence between our actions and dispositions, a strict regard to truth, and an irreconcilable abhorrence of falsehood. It does not indeed require, that we expose our sentiments indiscreetly, or tell all the truth in every case; but certainly it does not and cannot admit the least violation of truth or contradiction to our sentiments. For if these bounds are once passed, no possible limit can be assigned where the violation shall stop, and no pretence of private or public good can possibly counterbalance the ill consequences of such a violation.

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compacts,
&c.

Fidelity to promises, compacts, and engagements, is likewise a duty of such importance to the security of commerce and interchange of benevolence among mankind, that society would soon grow intolerable without the strict observance of it. Hobbes, and others who follow the same track, have taken a wonderful deal of pains to puzzle this subject, and to make all the virtues of this sort merely *artificial*, and not at all *obligatory*, antecedent to human conventions. No doubt compacts suppose people who make them; and promises persons to whom they are made; and therefore both suppose some society, more or less, between those who enter into these mutual engagements. But is not a compact or promise binding, till men have agreed that they shall be binding? or are they only binding, because it is our interest to be bound by them, or to fulfil them? Do not we highly approve the man who fulfils them, even though they should prove to be against his interest? and do not we condemn him as a knave who violates them on that account? A promise is a voluntary declaration by words, or by an action equally significant, of our resolution to do something in behalf of another, or for his service. When it is made, the person who makes it is by all supposed under an obligation to perform it. And he to whom it is made may demand the performance as his right. That perception of *obligation* is a simple idea, and is on the same footing as our other moral perceptions, which may be described by instances, but cannot be defined. Whether we have a perception of such obligation quite distinct from the interest, either public or private, that may accompany the fulfilment of it, must be referred to the conscience of every individual. And whether the mere sense of that obligation, apart from its concomitants, is not a sufficient inducement or motive to keep one's promise, without ha-

ving recourse to any selfish principle of our nature, must be likewise appealed to the conscience of every honest man.

It may, however, be not improper to remark, that in this, as in all other instances, our chief good is combined with our duty. "Men act from expectation." Expectation is in most cases determined by the assurances and engagements which we receive from others. If no dependence could be placed upon these assurances, it would be impossible to know what judgment to form of many future events, or how to regulate our conduct with respect to them. Confidence, therefore, in promises, is essential to the intercourse of human life, because without it the greatest part of our conduct would proceed upon chance. But there could be no confidence in promises, if men were not obliged to perform them." Those, therefore, who allow not to the perceptions of the moral sense all that authority which we attribute to them, must still admit the obligation to perform promises; because such performance may be shown to be agreeable to the will of God, in the very same manner in which upon their principles we have shown the uniform practice of justice to be so.

Fair-dealing and *fidelity to compacts* require that we take no advantage of the ignorance, passion, or incapacity of others, from whatever cause that incapacity arises;—that we be explicit and candid in making bargains, just and faithful in fulfilling our part of them. And if the other party violates his engagements, redress is to be sought from the laws, or from those who are intrusted with the execution of them. In fine, the *commercial* virtues and duties require that we not only do not invade, but maintain the rights of others;—that we be fair and impartial in transferring, bartering, or exchanging property, whether in goods or service; and be inviolably faithful to our word and our engagements, where the matter of them is not criminal, and where they are not extorted by force. See PROMISE.

SECT. VII. *Social Duties of the POLITICAL Kind.*

WE are now arrived at the last and highest order of duties respecting society, which result from the exercise of the most generous and heroic affections, and are founded on our most enlarged connections.

The *social* principle in man is of such an expansive nature, that it cannot be confined within the circuit of a family, of friends, or a neighbourhood; it spreads into wider systems, and draws men into larger confederacies, communities, and commonwealths. It is in these only that the higher powers of our nature attain the highest improvement and perfection of which they are capable. These principles hardly find objects in the solitary state of nature. There the principle of action rises no higher at farthest than *natural affection* towards one's offspring. There personal or family wants entirely engross the creature's attention and labour, and allow no leisure, or, if they did, no exercise for views and affections of a more enlarged kind. In *solitude* all are employed in the same way, in providing for the *animal* life. And even after their utmost labour and care, single and unaided by the industry of others, they find but a sorry supply of their wants, and a feeble precarious security against dangers from wild beasts; from inclement skies and seasons;

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sons; from the mistakes or petulant passions of their fellow-creatures; from their preference of themselves to their neighbours; and from all the little exorbitances of self-love. But in *society*, the mutual aids which men give and receive shorten the labours of each, and the combined strength and reason of individuals give security and protection to the whole body. There is both a variety and subordination of genius among mankind. Some are formed to lead and direct others, to contrive plans of happiness for individuals, and of government for communities, to take in a public interest, invent laws and arts, and superintend their execution, and, in short, to refine and civilize human life. Others, who have not such good heads, may have as honest hearts, a truly public spirit, love of liberty, hatred of corruption and tyranny, a generous submission to laws, order, and public institutions, and an extensive philanthropy. And others, who have none of those capacities either of heart or head, may be well formed for manual exercises and bodily labour. The former of these principles have no scope in solitude, where a man's thoughts and concerns do all either centre in himself or extend no farther than a family; into which little circle all the duty and virtue of the solitary mortal is crowded. But society finds proper objects and exercises for every genius, and the noblest objects and exercises for the noblest geniuses, and for the highest principles in the human constitution; particularly for that warmest and most divine passion which God hath kindled in our bosoms, the inclination of doing good, and reverencing our nature; which may find here both employment and the most exquisite satisfaction. In society, a man has not only more leisure, but better opportunities, of applying his talents with much greater perfection and success, especially as he is furnished with the joint advice and assistance of his fellow creatures, who are now more closely united one with the other, and sustain a common relation to the same moral system or community. This then is an object proportioned to his most enlarged social affections; and in serving it he finds scope for the exercise and refinement of his highest intellectual and moral powers. *Therefore society, or a state of civil government, rests on these two principal pillars, "That in it we find security against those evils which are unavoidable in solitude—and obtain those goods, some of which cannot be obtained at all, and others not so well, in that state where men depend solely on their individual sagacity and industry."*

From this short detail it appears, that *man* is a *social* creature, and formed for a *social* state; and that *society*, being adapted to the higher principles and destinations of his nature, must of necessity be his *natural* state.

The duties suited to that state, and resulting from those principles and destinations, or, in other words, from our social passions and social connections, or relation to a public system, are, *love of our country, resignation, and obedience to the laws, public spirit, love of liberty, sacrifice of life and all to the public, and the like.*

Love of our country, is one of the noblest passions that can warm and animate the human breast. It includes all the limited and particular affections to our

parents, friends, neighbours, fellow-citizens, countrymen. It ought to direct and limit their more confined and partial actions within their proper and natural bounds, and never let them inroach on those sacred and first regards we owe to the great public to which we belong. Were we solitary creatures, detached from the rest of mankind, and without any capacity of comprehending a *public interest*, or without affections leading us to desire and pursue it, it would not be our duty to mind it, nor criminal to neglect it. But as we are *PARTS* of the *public system*, and are not only capable of taking in large views of its interests, but by the strongest affections connected with it, and prompted to take a share of its concerns, we are under the most sacred ties to prosecute its security and welfare with the utmost ardour, especially in times of public trial. This *love of our country* does not import an attachment to any particular soil, climate, or spot of earth, where perhaps we first drew our breath, though those *natural* ideas are often associated with the *moral* ones, and, like external signs or symbols, help to ascertain and bind them; but it imports an affection to that *moral system*, or *community*, which is governed by the same laws and magistrates, and whose several parts are variously connected one with the other, and all united upon the bottom of a common interest. Perhaps indeed every member of the community cannot comprehend so large an object, especially if it extends through large provinces, and over vast tracts of land; and still less can he form such an idea, if there is no *public*, i. e. if all are subject to the caprice and unlimited will of one man; but the preference the generality show to their native country, the concern and longing after it which they express when they have been long absent from it; the labours they undertake and sufferings they endure to save or serve it, and the peculiar attachment they have to their countrymen, evidently demonstrate that the passion is *natural*, and never fails to exert itself when it is fairly disengaged from foreign clogs, and is directed to its proper object. Wherever it prevails in its genuine vigour and extent, it swallows up all sordid and selfish regards; it conquers the love of *ease, power, pleasure, and wealth*; nay, when the amiable partialities of *friendship, gratitude, private affection, or regards to a family*, come in competition with it, it will teach us bravely to sacrifice all, in order to maintain the rights, and *promote or defend* the honour and happiness, of our country.

Resignation and obedience to the laws and orders of the society to which we belong, are political duties necessary to its very being and security, without which it must soon degenerate into a state of licentiousness and anarchy. The welfare, nay, the nature of civil society, requires, that there should be a subordination of orders, or diversity of ranks and conditions in it;—that certain men, or orders of men, be appointed to superintend and manage such affairs as concern the public safety and happiness;—that all have their particular provinces assigned them;—that such a subordination be settled among them as none of them may interfere with another; and finally, that certain *rules or common measures of action* be agreed on, by which each is to discharge his respective duty to govern or be governed, and all may concur in securing the order

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der, and promoting the felicity, of the whole political body. Those *rules of action* are the *laws* of the community; and those different *orders* are the several officers or magistrates appointed by the public to explain them, and superintend or assist in their execution. In consequence of this settlement of things, it is the duty of each individual to obey the laws enacted; to submit to the executors of them with all due deference and homage, according to their respective ranks and dignity, as to the keepers of the public peace, and the guardians of public liberty; to maintain his own rank, and perform the functions of his own station, with diligence, fidelity, and incorruption. The superiority of the *higher orders*, or the authority with which the state has invested them, intitle them, especially if they employ their authority well, to the obedience and submission of the *lower*, and to a proportionable honour and respect from all. The subordination of the lower ranks claims protection, defence, and security from the higher. And the laws, being superior to all, require the obedience and submission of all, being the last resort, beyond which there is no decision or appeal.

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of public
spirit, love
of liberty,
&c.

Public spirit, heroic zeal, love of liberty, and the other *political duties*, do, above all others, recommend those who practise them to the admiration and homage of mankind; because, as they are the offspring of the noblest minds, so are they the parents of the greatest blessing to society. Yet, exalted as they are, it is only in equal and free governments where they can be exercised and have their due effect. For there only does a true *public spirit* prevail, and there only is the *public good* made the standard of the civil constitution. As the end of society is the *common interest* and *welfare* of the people associated, this end must of necessity be the *supreme law* or *common standard*, by which the particular rules of action of the several members of the society towards each other are to be regulated. But a *common interest* can be no other than that which is the result of the *common reason* or *common feelings* of all. Private men, or a particular order of men, have interests and feelings peculiar to themselves, and of which they may be good judges; but these may be separate from, and often contrary to, the interests and feelings of the rest of the society; and therefore they can have no right to make, and much less to impose, laws on their fellow-citizens, inconsistent with, and opposite to, those interests and those feelings. Therefore, a *society*, a *government*, or *real public*, truly worthy the name, and not a confederacy of banditti, a clan of lawless savages, or a band of slaves under the whip of a master, must be such a one as consists of freemen, chusing or consenting to laws themselves; or, since it often happens that they cannot assemble and act in a *collective body*, delegating a sufficient number of *representatives*, i. e. such a number as shall most fully comprehend, and most equally represent, their *common feelings* and *common interests*, to digest and vote laws for the conduct and controul of the whole body, the most agreeable to those common feelings and common interests.

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every citizen.

A society thus constituted by *common reason*, and formed on the plan of a *common interest*, becomes immediately an object of public attention, public veneration, public obedience, a public and inviolable attachment.

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ment, which ought neither to be seduced by bribes, nor awed by terrors; an object, in fine, of all those extensive and important duties which arise from so glorious a confederacy. To watch over such a system; to contribute all he can to promote its good by his reason, his ingenuity, his strength, and every other ability, whether natural or acquired; to resist, and, to the utmost of his power, defeat every incroachment upon it, whether carried on by a secret corruption or open violence; and to sacrifice his ease, his wealth, his power, nay life itself, and, what is dearer still, his family and friends, to defend or save it, is the duty, the honour, the interest, and the happiness of every citizen; it will make him venerable and beloved while he lives, be lamented and honoured if he falls in so glorious a cause, and transmit his name with immortal renown to the latest posterity.

As the PEOPLE are the fountain of power and authority, the original seat of majesty, the authors of laws, and the creators of officers to execute them; if they shall find the power they have conferred abused by their trustees, their majesty violated by tyranny or by usurpation, their authority prostituted to support violence or screen corruption, the laws grown pernicious through accidents unforeseen or unavoidable, or rendered ineffectual through the infidelity and corruption of the executors of them; then it is their right, and what is their right is their duty, to resume that delegated power, and call their trustees to an account; to resist the usurpation, and extirpate the tyranny; to restore their sullied majesty and prostituted authority; to suspend, alter, or abrogate those laws, and punish their unfaithful and corrupt officers. Nor is it the duty only of the united body; but every member of it ought, according to his respective rank, power, and weight in the community, to concur in advancing and supporting these glorious designs.

Resistance, therefore, being undoubtedly lawful in extraordinary emergencies, the question, among good reasoners, can only be with regard to the degree of necessity which can justify resistance, and render it expedient or commendable. And here we must acknowledge, that, with Mr Hume*, "we shall always incline to their side that draw the bond of allegiance very close, and who consider an infringement of it as the last refuge in desperate cases, when the public is in the highest danger from violence and tyranny. For besides the mischiefs of a civil war, which commonly attends insurrection, it is certain, that where a disposition to rebellion appears among any people, it is one chief cause of tyranny in the rulers, and forces them into many violent measures, which, had every one been inclined to submission and obedience, they would never have embraced. Thus the *tyrannicide*, or assassination approved of by ancient maxims, instead of keeping tyrants and usurpers in awe, made them ten times more fierce and unrelenting; and is now justly abolished on that account by the laws of nations, and universally condemned, as a base and treacherous method of bringing to justice those disturbers of society."

CHAP. IV. Duty to God.

Of all the *relations* which the human mind sustains, that which subsists between the *Creator* and his *creatures*,

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tures, the supreme *Lawgiver* and his *subjects*, is the highest and the best. This relation arises from the nature of a *creature* in general, and the *constitution* of the *human mind* in particular; the noblest powers and affections of which point to an *universal* mind, and would be imperfect and abortive without such a direction. How lame then must that system of morals be, which leaves a *Deity* out of the question! How disconsolate, and how destitute of its firmest support!

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of God.

It does not appear, from any true history or experience of the mind's progress, that any man, by any formal deduction of his discursive power, ever reasoned himself into the belief of a God. Whether such a belief is only some *natural anticipation* of soul, or is derived from father to son, and from one man to another, in the way of *tradition*, or is suggested to us in consequence of an *immutable law* of our nature, on beholding the august aspect and beautiful order of the universe, we will not pretend to determine. What seems most agreeable to experience is, that a *sense* of its *beauty* and *grandeur*, and the *admirable fitness* of one thing to another in its vast apparatus, leads the mind necessarily and unavoidably to a perception of a *design*, or of a *designing cause*, the origin of all, by a progress as simple and natural as that by which a *beautiful picture* or a *fine building* suggests to us the idea of an *excellent artist*. For it seems to hold universally true, that wherever we discern a *tendency* or *co-operation* of things towards a *certain end*, or producing a common effect, there, by a necessary *law of association*, we apprehend *design*, a *designing energy* or *cause*. No matter whether the objects are *natural* or *artificial*, still that suggestion is unavoidable, and the *connection* between the *effect* and its *adequate cause* obtrudes itself on the mind, and it requires no nice search or elaborate deduction of reason to trace or prove that connection. We are particularly satisfied of its truth in the subject before us by a kind of direct intuition; and we do not seem to attend to the maxim we learn in schools, "That there cannot be an *infinite series* of *causes* and *effects* producing and produced by one another." That maxim is familiar only to metaphysicians; but all men of sound understanding are led to believe the existence of a God. We are conscious of our *existence*, of *thought*, *sentiment*, and *passion*, and sensible withal that these came not of ourselves; therefore we immediately recognise a *parent-mind*, an *original intelligence*, from whom we borrowed those little portions of thought and activity. And while we not only feel *kind* affections in ourselves, and discover them in others, but likewise behold round us such a number and variety of creatures, endued with natures nicely adjusted to their several stations and economies, supporting and supported by each other, and all sustained by a *common order* of things, and sharing different degrees of happiness according to their respective capacities, we are naturally and necessarily led up to the Father of such a numerous offspring, the fountain of such wide-spread happiness. As we conceive this Being before all, above all, and greater than all, we naturally, and without reasoning, ascribe to him every kind of perfection, wisdom, power, and goodness without bounds, existing through all time, and pervading all space. We apply to him those glorious epithets of our *Creator*, *Preserver*, *Benefactor*, the *supreme Lord* and *Lawgiver* of the whole society of ra-

tional and intelligent creatures. Not only the imperfections and wants of our being and condition, but some of the noblest instincts and affections of our minds, connect us with this great and universal nature. The mind, in its progress from object to object, from one character and prospect of beauty to another, finds some blemish or deficiency in each, and soon exhausts or grows weary and dissatisfied with its subject; it sees no character of excellency among men equal to that pitch of esteem which it is capable of exerting; no object within the compass of human things adequate to the strength of its affection: nor can it stay any where in this self-expansive progress, or find repose after its highest flights, till it arrives at a Being of unbounded greatness and worth, on whom it may employ its sublimest powers without exhausting the subject, and give scope to the utmost force and fulness of its love without satiety or disgust. So that the nature of this Being corresponds to the nature of man; nor can his intelligent and moral powers obtain their entire end, but on the supposition of such a Being, and without a real sympathy and communication with him. The native propensity of the mind to reverence whatever is *great* and *wonderful* in nature, finds a proper object of homage in him who spread out the heavens and the earth, and who sustains and governs the whole of things. The *admiration* of beauty, the *love* of order, and the *complacency* we feel in goodness, must rise to the highest pitch, and attain the full vigour and joy of their operations, when they unite in him who is the sum and source of all perfection.

It is evident from the slightest survey of morals, ¹⁷¹ that how punctual soever one may be in performing of impiety. the duties which result from our relations to mankind, yet to be quite deficient in performing those which arise from our *relation* to the *Almighty*, must argue a strange perversion of *reason* or depravity of *heart*. If imperfect degrees of worth attract our veneration, and if the want of it would imply an insensibility, or, which is worse, an aversion to merit, what lameness of affection or immorality of character must it be to be unaffected with, and much more to be ill-affected to, a Being of superlative worth! To love society, or particular members of it, and yet to have no sense of our connection with its Head, no affection to our common Parent and Benefactor; to be concerned about the approbation or censure of our fellow-creatures, and yet to feel nothing of this kind towards him who sees and weighs our actions with unerring wisdom and justice, and can fully reward or punish them, betrays equal madness and partiality of mind. It is plain, therefore, beyond all doubt, that some regards are due to the great Father of all, in whom every lovely and adorable quality combines to inspire veneration and homage.

As it has been observed already, that our *affections* ¹⁷² depend on our *opinions* of their objects, and generally Right opi- nions of God. keep pace with them, it must be of the highest importance, and seems to be among the first duties we owe to the Author of our being, "to form the least imperfect, since we cannot form perfect, conceptions of his *character* and *administration*." For such *conceptions*, thoroughly imbibed, will render our *religion* rational, and our *dispositions* refined. If our *opinions* are diminutive and distorted, our religion will be superstitious,

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human
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Rational
faith.

stitious, and our temper abject. Thus, if we ascribe to the Deity that false majesty which consists in the unbenevolent and sullen exercise of mere *will* or *power*, or suppose him to delight in the prostrations of servile fear, or as servile praise, he will be worshipped with mean adulation and a profusion of compliments. Farther, if he be looked upon as a stern and implacable Being, delighting in vengeance, he will be adored with pompous offerings, sacrifices, or whatever else may be thought proper to soothe and mollify him. But if we believe *perfect goodness* to be the character of the supreme Being, and that he loves those most who resemble him most, the worship paid him will be rational and sublime, and his worshippers will seek to please him by imitating that goodness which they adore. The foundation then of all true religion is a *rational faith*. And of a rational faith these seem to be the chief articles, to believe, "that an infinite all-perfect Mind exists, who has no opposite nor any separate interest from that of his creatures;—that he superintends and governs all creatures and things;—that his goodness extends to all his creatures, in different degrees indeed, according to their respective natures, but without any partiality or envy;—that he does every thing for the best, or in a subserviency to the perfection and happiness of the whole; particularly that he directs and governs the affairs of men, inspects their actions, distinguishes the *good* from the *bad*, loves and befriends the former, is displeased with and pities the latter in *this* world, and will according to their respective deserts reward one and punish the other in the next;—that, in fine, he is always carrying on a scheme of virtue and happiness through an unlimited duration; and is ever guiding the universe, through its successive stages and periods, to higher degrees of perfection and felicity." This is true *Theism*, the glorious scheme of divine faith; a scheme exhibited in all the works of God, and executed through his whole administration.

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Morality
of theism.

This faith, well-founded and deeply felt, is nearly connected with a *true moral taste*, and hath a powerful efficacy on the temper and manners of the theist. He who admires goodness in others, and delights in the practice of it, must be conscious of a reigning order within, a rectitude and candour of heart, which disposes him to entertain favourable apprehensions of men, and, from an impartial survey of things, to presume that *good order* and *good meaning* prevail in the universe; and if good meaning and good order, then an *ordering*, an *intending mind*, who is no enemy, no tyrant to his creatures, but a *friend*, a *benefactor*, an *indulgent sovereign*. On the other hand, a bad man, having nothing goodly or generous to *contemplate within*, no right intentions, nor honesty of heart, suspects every person and every thing; and, beholding nature through the gloom of a selfish and guilty mind, is either averse to the belief of a reigning order, or, if he cannot suppress the unconquerable anticipations of a governing mind, he is prone to tarnish the beauty of nature, and to impute malevolence, or blindness and impotence at least, to the Sovereign Ruler. He turns the universe into a forlorn and horrid waste, and transfers his own character to the Deity, by ascribing to him that uncommunicative grandeur, that arbitrary or revengeful spirit, which he affects or admires in himself. As such

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Immorality
of atheism.

a temper of mind naturally leads to *atheism*, or to a *superstition* full as bad; therefore, as far as that temper depends on the unhappy creature on whom it prevails, the propensity to atheism or superstition consequent thereto must be *immoral*. Farther, if it be true that the belief or sense of a Deity is natural to the mind, and the evidence of his existence reflected from his works so full as to strike even the most superficial observer with conviction, then the supplanting or corrupting that sense, or the want of due attention to that evidence, and, in consequence of both, a supine ignorance or affected unbelief of a Deity, must argue a bad temper or an immoral turn of mind. In the case of invincible ignorance, or a very bad education, tho' nothing can be concluded directly against the character; yet whenever ill passions and habits pervert the judgment, and by perverting the judgment terminate in atheism, then the case becomes plainly criminal.

But let casuists determine this as they will, a true faith in the divine character and administration is generally the consequence of a virtuous state of mind. The man who is truly and habitually good, feels the *love of order*, of *beauty*, and *goodness*, in the strongest degree; and therefore cannot be insensible to those emanations of them which appear in all the works of God, nor help loving their supreme source and model. He cannot but think, that he who has poured such beauty and goodness over all his works, must himself delight in beauty and goodness, and what he delights in must be both amiable and happy. Some indeed there are, and it is pity there should be any such, who, through the unhappy influence of a wrong education, have entertained dark and unfriendly thoughts of a Deity and his administration, though otherwise of a virtuous temper themselves. However, it must be acknowledged, that such sentiments have, for the most part, a bad effect on the temper; and when they have not, it is because the undepraved affections of an honest *heart* are more powerful in their operation than the speculative opinions of an ill informed *head*.

But wherever right conceptions of the Deity and his providence prevail, when he is considered as the inexhausted source of light, and love, and joy, as acting in the joint character of a *Father* and *Governor*, imparting an endless variety of capacities to his creatures, and supplying them with every thing necessary to their full completion and happiness; what veneration and gratitude must such conceptions, thoroughly believed, excite in the mind? How natural and delightful must it be to one whose heart is open to the perception of truth, and of every thing *fair*, *great*, and *wonderful* in nature, to contemplate and adore him who is the first *fair*, the first *great*, and first *wonderful*; in whom *wisdom*, *power*, and *goodness*, dwell vitally, essentially, originally, and act in perfect concert? What *grandeur* is here to fill the most enlarged capacity, what *beauty* to engage the most ardent love, what a mass of *wonders* in such exuberance of perfection to astonish and delight the human mind through an unfailing duration!

If the *Deity* is considered as our supreme *Guardian* and *Benefactor*, as the *Father of Mercies*, who loves his creatures with infinite tenderness, and in a particular manner all good men, nay all who delight in goodness, even in its most imperfect degrees; what resignation,

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The connection of
theism and
virtue.177
Duties of
gratitude,
love, &c.178
Other affec-
tions.

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God.

nation, what dependence, what generous confidence, what hope in God and his all-wise providence, must arise in the soul that is possessed of such amiable views of him? All those exercises of piety, and above all a superlative esteem and love, are directed to God as to their *natural*, their *ultimate*, and indeed their only *adequate* object; and though the immense obligations we have received from him may excite in us more lively feelings of divine goodness than a general and abstracted contemplation of it, yet the affections of *gratitude* and *love* are of themselves of the generous disinterested kind, not the result of self-interest, or views of reward. A perfect character, in which we always suppose infinite goodness, guided by unerring wisdom, and supported by almighty power, is the proper object of perfect love; which, as such, we are forcibly drawn to pursue and to aspire after. In the contemplation of the divine nature and attributes, we find at last what the ancient philosophers sought in vain, the SUPREME AND SOVEREIGN GOOD; from which all other goods arise, and in which they are all contained. The Deity therefore challenges our supreme and sovereign love, a sentiment which, whosoever indulges, must be confirmed in the love of virtue, in a desire to imitate its all-perfect pattern, and in a cheerful security that all his great concerns, those of his friends and of the universe, shall be absolutely safe under the conduct of unerring wisdom and unbounded goodness. It is in his care and providence alone that the good man, who is anxious for the happiness of all, finds perfect serenity; a serenity neither ruffled by partial ill nor soured by private disappointment.

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Repentance
&c.

When we consider the unstained purity and absolute perfection of the *divine* nature, and reflect withal on the imperfection and various blemishes of our own, we must sink, or be convinced we ought to sink, into the deepest humility and prostration of soul before him who is so wonderfully great and holy. When, further, we call to mind what low and languid feelings we have of the divine presence and majesty, what insensibility of his fatherly and universal goodness, nay, what ungrateful returns we have made to it, how far we come short of the perfection of his law and the dignity of our own nature, how much we have indulged to the selfish passions, and how little to the benevolent ones; we must be conscious that it is our duty to repent of a temper and conduct so unworthy our nature and unbecoming our obligations to its Author, and to resolve and endeavour to act a wiser and better part for the future.

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Hopes of
pardon.

Nevertheless, from the character which his works exhibit of him, from those delays or alleviations of punishment which offenders often experience, and from the merciful tenor of his administration in many other instances, the sincere penitent may entertain good hopes that his Parent and Judge will not be strict to mark iniquity, but will be propitious and favourable to him, if he honestly endeavours to avoid his former practices, and subdue his former habits, and to live in a greater conformity to the divine will for the future. If any doubts or fears should still remain, how far it may be consistent with the rectitude and equity of the divine government to let his iniquities pass unpunished, yet he cannot think it unsuitable to his paternal clemency and wisdom to contrive a method of retrieving

the penitent offender, that shall unite and reconcile the majesty and mercy of his government. If reason cannot of itself suggest such a scheme, it gives at least some ground to expect it. But though *natural religion* cannot let in moral light and assurance on so interesting a subject, yet it will teach the humble thief to wait with great submission for any farther intimations it may please the supreme Governor to give of his will; to examine with candour and impartiality whatever evidence shall be proposed to him of a *divine revelation*, whether that evidence is *natural* or *supernatural*; to embrace it with veneration and cheerfulness, if the evidence is clear and convincing; and finally, if it bring to light any *new relations* or *connections*, *natural religion* will persuade its sincere votary faithfully to comply with the *obligations*, and perform the *duties* which result from those relations and connections. This is *theism*, *piety*, the *completion of morality*!

We must farther observe, that all those affections which we supposed to regard the Deity as their *immediate* and *primary* object, are vital energies of the soul, and consequently exert themselves into act, and, like all other energies, gain strength or greater activity by that exertion. It is therefore our *duty* as well as highest *interest*, often at stated times, and by decent and solemn acts, to contemplate and adore the great Original of our existence, the Parent of all beauty and of all good; to express our veneration and love by an awful and devout recognition of his perfections; and to evidence our gratitude by celebrating his goodness, and thankfully acknowledging all his benefits. It is likewise our duty, by proper exercises of sorrow and humiliation, to confess our ingratitude and folly; to signify our dependence on God, and our confidence in his goodness, by imploring his blessing and gracious concurrence in assisting the weakness and curing the corruptions of our nature; and finally, to testify our sense of his authority, and our faith in his government, by devoting ourselves to do his will, and resigning ourselves to his disposal. These duties are not therefore obligatory, because the Deity needs or can be profited by them; but as they are apparently *decent* and *moral*, suitable to the relations he sustains of our *Creator*, *Benefactor*, *Lawgiver*, and *Judge*; expressive of our state and obligations; and improving to our tempers, by making us more rational, social, god-like, and consequently more happy.

We have now considered INTERNAL piety, or the *worship of the mind*, that which is in spirit and in truth; we shall conclude the section with a short account of that which is EXTERNAL. *External worship* is founded on the same principles as *internal*, and of as strict moral obligation. It is either *private* or *public*. *Devotion* that is *inward*, or *purely intellectual*, is too spiritual and abstracted an operation for the bulk of mankind. The operations of their minds, such especially as are employed on the most sublime, immaterial objects, must be assisted by their outward organs, or by some help from the imagination; otherwise they will soon be dissipated by sensible impressions, or grow tiresome if too long continued. Ideas are such fleeting things, that they must be fixed; and so subtle, that they must be expressed and delineated, as it were, by sensible marks and images; otherwise we cannot attend

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Worship,
praise,
thank-
giving.

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External
worship.

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God.

attend to them, nor be much affected by them. *Therefore verbal adoration, prayer, praise, thanksgiving, and confession, are admirable aids to inward devotion, fix our attention, compose and enliven our thoughts, impress us more deeply with a sense of the awful presence in which we are, and, by a natural and mechanical sort of influence, tend to heighten those devout feelings and affections which we ought to entertain, and after this manner reduce into formal and explicit act.*

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Public wor-
ship.

This holds true in an higher degree in the case of *public worship*, where the presence of our fellow-creatures, and the powerful contagion of the *social affections*, conspire to kindle and spread the devout

flame with greater warmth and energy. To conclude: As God is the parent and head of the social system, as he has formed us for a social state, as by one we find the best security against the ills of life, and in the other enjoy its greatest comforts, and as, by means of both, our nature attains its highest improvement and perfection; and moreover, as there are *public blessings* and *crimes* in which we all share in some degree, and *public wants* and *dangers* to which all are exposed—it is therefore evident, that the various and solemn offices of *public religion* are duties of indispensable moral obligation, among the best cements of society, the firmest prop of government, and the fairest ornament of both.

Duty to
God.

P A R T III.

CHAP. I. OF PRACTICAL ETHICS, or the CULTURE of the MIND.

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Dignity
and impor-
tance of the
subject.

WE have now gone through a particular detail of the several duties we owe to OURSELVES, to SOCIETY, and to GOD. In considering the *first order* of duties, we just touched on the methods of acquiring the different kinds of goods which we are led by nature to pursue; only we left the consideration of the method of acquiring the *moral* goods of the mind to a chapter by itself, because of its singular importance. This chapter then will contain a brief enumeration of the arts of acquiring *virtuous habits*, and of eradicating *vicious ones*, as far as is consistent with the brevity of such a work: a subject of the utmost difficulty as well as importance in morals; to which, nevertheless, the least attention has been generally given by *moral* writers. This will properly follow a detail of duty, as it will direct us to such *means* or *helps* as are most necessary and conducive to the practice of it.

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Sensible
ideas and
sensible
taste.

In the first part of this inquiry we traced the order in which the passions shoot up in the different periods of human life. That order is not accidental, or dependent on the caprice of men, or the influence of custom and education, but arises from the original constitution and laws of our nature; of which this is one, viz. "That sensible objects make the first and strongest impressions on the mind." These, by means of our outward organs, being conveyed to the mind, become objects of its attention, on which it reflects when the outward objects are no longer present, or, in other words, when the impressions upon the outward organs cease. These objects of the mind's reflection are called *ideas* or *notions*. Towards these, by another law of our nature, we are not altogether indifferent; but correspondent movements of *desire* or *aversion*, *love* or *hatred*, arise, according as the objects which they denote made an agreeable or disagreeable impression on our organs. Those *ideas* and *affections* which we experience in the *first* period of life, we refer to the *body*, or to *sense*; and the *taste* which is formed towards them, we call a *sensible*, or a merely *natural taste*; and the objects corresponding to them we in general call *good* or *pleasant*.

But as the mind moves forward in its course, it extends its views, and receives a new and more complex

set of ideas, in which it observes *uniformity*, *variety*, *similitude*, *symmetry of parts*, *reference to an end*, *novelty*, *grandeur*. These compose a vast train and diversity of *imagery*, which the mind compounds, divides, and moulds into a thousand forms, in the absence of those objects which first introduced it. And this more complicated imagery suggests a new train of *desires* and *affections*, full as sprightly and engaging as any which have yet appeared. This whole class of *perceptions* or *impressions* is referred to the *imagination*, and forms an higher taste than the *sensible*, and which has an immediate and mighty influence on the *finer* passions of our nature, and is commonly termed a *fine taste*.

The objects which correspond to this taste we use to call *beautiful*, *great*, *harmonious*, or *wonderful*, or in general by the name of *beauty*.

The mind, still pushing onwards and increasing its stock of ideas, ascends from those to an higher species of objects, viz. the *order* and *mutual relations* of minds to each other, their reciprocal *affections*, *characters*, *actions*, and various *aspects*. In these it discovers a *beauty*, a *grandeur*, a *decorum*, more interesting and alluring than in any of the former kinds. These objects, or the notions of them, passing in review before the mind, do, by a necessary law of our nature, call forth another and nobler set of affections, as *admiration*, *esteem*, *love*, *honour*, *gratitude*, *benevolence*, and others of the like tribe. This class of *perfections*, and their correspondent *affections*, we refer, because of their objects (*manners*), to a *moral* sense, and call the *taste* or *temper* they excite, *moral*. And the objects which are agreeable to this *taste* or *temper* we denominate by the general name of *moral beauty*, in order to distinguish it from the other, which is termed *natural*.

These different sets of *ideas* or *notions* are the materials about which the mind employs itself, which it blends, ranges, and diversifies ten thousand different ways. It feels a strong propension to connect and associate those ideas among which it observes any *similitude* or any *aptitude*, whether *original* and *natural*, or *customary* and *artificial*, to suggest each other. See METAPHYSICS.

But whatever the reasons are, whether *similitude*, *co-existence*, *causality*, or any other *aptitude* or *relation*, why any two or more ideas are connected by the mind at first, it is an established law of our nature, "that when two or more ideas have often started in company,

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the Mind.

company, they form so strong an union, that it is very difficult ever after to separate them." Thus the *lover* cannot separate the idea of *merit* from his *mistress*; the *courtier* that of *dignity* from his *title* or *ribbon*; the *miser* that of *happiness* from his *bags*. It is these associations of *worth* or *happiness* with any of the different sets of *objects* or *images* before specified, that form our *taste* or *complex idea* of *good*. By another law of our nature, "our *affections* follow and are governed by this *taste*. And to these *affections* our *character* and *conduct* are similar and proportioned; on the general tenor of which our *happiness* principally depends."

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Leading
passions fol-
low taste.

As all our *leading* passions then depend on the direction which our *taste* takes, and as it is always of the same strain with our *leading* associations, it is worth while to inquire a little more particularly how these are formed, in order to detect the secret sources from whence our passions derive their principal strength, their various rises and falls. For this will give us the true key to their management, and let us into the right method of correcting the *bad* and improving the *good*.

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The impor-
tance and
use of the
imagina-
tion.

No kind of objects make so powerful an impression on us as those which are immediately impressed on our *senses*, or strongly painted on our *imagination*. Whatever is purely *intellectual*, as abstracted or scientific truths, the subtle relations and differences of things, has a fainter sort of existence in the mind; and though it may exercise and whet the *memory*, the *judgment*, or the *reasoning power*, gives hardly any impulse at all to the *active* powers, the *passions*, which are the main springs of motion. On the other hand, were the mind entirely under the direction of *sense*, and impressible only by such objects as are present, and strike some of the outward organs, we should then be precisely in the state of the brute creation, and be governed solely by *instinct* or *appetite*, and have no power to controul whatever impressions are made upon us: Nature has therefore endued us with a *middle faculty*, wonderfully adapted to our *mixed* state, which holds partly of *sense* and partly of *reason*, being strongly allied to the *former*, and the common receptacle in which all the notices that come from that quarter are treasured up; and yet greatly subservient and ministerial to the *latter*, by giving a body, a coherence, and beauty to its conceptions. This *middle faculty* is called the *imagination*, one of the most busy and fruitful powers of the mind. Into this common storehouse are likewise carried all those *moral forms* which are derived from our *moral faculties* of perception; and there they often undergo new changes and appearances, by being mixed and wrought up with the ideas and forms of *sensible* or *natural* things. By this coalition of imagery, *natural beauty* is dignified and heightened by *moral qualities* and *perfections*, and *moral qualities* are at once exhibited and set off by *natural beauty*. The *sensible* beauty, or good, is refined from its dross by partaking of the *moral*; and the *moral* receives a stamp, a visible character and currency, from the *sensible*.

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Its energy
in various
instances in
heighten-
ing sensible
pleasures.

As we are first of all accustomed to *sensible* impressions and *sensible* enjoyments, we contract early a *sensual relish* or *love of pleasure*, in the lower sense of the word. In order, however, to justify this relish, the mind, as it becomes open to *higher* perceptions of *beauty* and *good*, borrows from thence a noble set of

images, as *fine taste*, *generosity*, *social affections*, *friendship*, *good fellowship*, and the like; and, by dressing out the old pursuits with these new ornaments, gives them an additional dignity and lustre. By these ways the *desire of a table*, *love of finery*, *intrigue*, and *pleasure*, are vastly increased beyond their natural pitch, having an impulse combined of the force of the *natural* appetites, and of the superadded strength of those *passions* which tend to the *moral species*. When the mind becomes more sensible to those objects or appearances in which it perceives *beauty*, *uniformity*, *grandeur*, and *harmony*, as fine cloaths, elegant furniture, plate, pictures, gardens, houses, equipage, the beauty of animals, and particularly the attractions of the sex; to these objects the mind is led by *nature* or taught by *custom*, the *opinion* and example of others, to annex certain ideas of *moral character*, *dignity*, *decorum*, *honour*, *liberality*, *tendernefs*, and *active* or *social enjoyment*. The consequence of this association is, that the objects to which these are annexed must rise in their value, and be pursued with proportionable ardour. The *enjoyment* of them is often attended with *pleasure*; and the mere *possession* of them, where that is wanting, frequently draws respect from one's fellow-creatures: This *respect* is, by many, thought equivalent to the pleasure of *enjoyment*. Hence it happens that the idea of *happiness* is connected with the mere *possession*, which is therefore eagerly sought after, without any regard to the *generous use* or *honourable enjoyment*. Thus the passion, resting on the *means*, not the *end*, i. e. losing sight of its *natural* object, becomes wild and extravagant.

In fine, any *object*, or *external denomination*, a *staff*, a *garter*, a *cup*, a *crown*, a *title*, may become a *moral* badge or emblem of *merit*, *magnificence*, or *honour*, according as these have been found or thought, by the possessors or admirers of them, to accompany them; yet, by the deception formerly mentioned, the *merit* or the *conduct* which intitled, or should intitle, to those marks of distinction, shall be forgot or neglected, and the *badges* themselves be passionately affected or pursued, as including every excellency. If these are attained by any means, all the concomitants which *nature*, *custom*, or *accidents* have joined to them, will be supposed to follow of course. Thus, *moral ends*, with which the unhappy admirer is apt to colour over his passion and views, will, in his opinion, justify the most *immoral means*, as *prostitution*, *adulation*, *fraud*, *treachery*, and every species of *knavery*, whether more open or more disguised.

When men are once engaged in *active* life, and find that *wealth* and *power*, generally called *INTEREST*, are the great avenues to every kind of enjoyment, they are apt to throw in many engaging *moral forms* to the object of their pursuit, in order to justify their passion, and varnish over the measures they take to gratify it, as *independency on the vices* or *passions* of others, *provision and security to themselves and friends*, *prudent economy*, or *well placed charity*, *social communication*, *superiority to their enemies*, who are all villains, *honourable service*, and many other ingredients of *merit*. To attain such capacities of *usefulness* or *enjoyment*, what arts, nay what meannesses, can be thought blameable by those cool pursuers of interest?—None have they whom the gay world is pleased to indulge

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In height-
ening the
pleasures
of beauty,
harmony,
&c.194
In raising
the value
of external
symbols,
&c.195
In height-
ening the
value of
wealth,
power, &c.

with

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Its influ-
ence on all
the passions.

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Moral cul-
ture, by
correcting
our taste or
imagina-
tion.

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By self de-
nial, and a
counter-
process.

with the title of *men of pleasure*, their imaginations less pregnant with *moral images*, with which they never fail to ennoble, or, if they cannot do that, to palliate their gross pursuits. Thus *admiration of wit*, of *sentiments* and *merit*, *friendship*, *love*, *generous sympathy*, *mutual confidence*, *giving* and *receiving pleasure*, are the ordinary ingredients with which they season their gallantry and pleasurable entertainments; and by which they impose on themselves, and endeavour to impose on others, that *their amours* are the joint issue of good sense and virtue.

These *associations*, variously combined and proportioned by the *imagination*, form the chief *private passions*, which govern the lives of the generality, as the *love of action*, of *pleasure*, *power*, *wealth*, and *fame*; they influence the *defensive*, and affect the *public passions*, and raise *joy* or *sorrow* as they are gratified or disappointed. So that in effect these associations of *good* and *evil*, *beauty* and *deformity*, and the passions they raise, are the main *binges of life* and *manners*, and the great *sources* of our *happiness* or *misery*. It is evident, therefore, that the whole of *moral culture* must depend on giving a right direction to the *leading passions*, and duly proportioning them to the *value* of the *objects* or *goods* pursued, under what name soever they may appear.

Now, in order to give them this *right direction* and *due proportion*, it appears, from the foregoing detail, that those *associations* of ideas, upon which the passions depend, must be *duly regulated*; that is to say, as an exorbitant passion for *wealth*, *pleasure*, or *power*, flows from an *association* or *opinion* that more *beauty* and *good*, whether *natural* or *moral*, enters into the enjoyment or possession of them, than really belongs to either; therefore, in restoring those passions to their just proportion, we must begin with correcting the *opinion*, or breaking the *false association*, or, in other words, we must decompound the *complex phantom* of *happiness* or *good*, which we fondly admire; disunite those ideas that have no natural alliance; and separate the *original idea* of *wealth*, *power*, or *pleasure*, from the foreign mixtures incorporated with it, which enhance its value, or give it its chief power to enchant and seduce the mind. For instance, let it be considered how poor and inconsiderable a thing *wealth* is, if it be disjoined from *real use*, or from ideas of *capacity* in the possessor to do good, from *independency*, *generosity*, *provision for a family* or *friends*, and *social communication* with others. By this *standard* let its true value be fixed; let its misapplication, or unbenevolent enjoyment, be accounted *fordid* and *infamous*; and nothing worthy or estimable be ascribed to the *mere possession* of it, which is not borrowed from its *generous use*.

If that *complex form* of *good* which is called *pleasure* engage us, let it be analysed into its constituent principles, or those allurements it draws from the *heart* and *imagination*, in order to heighten the low part of the indulgence; let the *separate* and *comparative* moment of each be distinctly ascertained and deduced from that gross part, and this remainder of the accumulated enjoyment will dwindle down into a poor, insipid, transitory thing. In proportion as the *opinion* of the *good* pursued abates, the *admiration* must decay, and the *passions* lose strength of course. One effectual

way to lower the *opinion*, and consequently to weaken the habit founded upon it, is to practise lesser pieces of self-denial, or to abstain, to a certain pitch, from the pursuit or enjoyment of the favourite object; and, that this may be the more easily accomplished, one must avoid those occasions, that company, those places, and the other circumstances, that enflamed *one* and endeared the *other*. And, as a *counter-process*, let *higher* or even *different* enjoyments be brought in view, other passions played upon the former, different places frequented, other exercises tried, company kept with persons of a different or more correct way of thinking, both in *natural* and *moral* subjects.

As much depends on our setting out well in life, let the *youthful fancy*, which is apt to be very florid and luxuriant, be early accustomed by *instruction*, *example*, and significant *moral exercises*, nay, by looks, gestures, and every other testimony of just approbation or blame, to annex ideas of *merit*, *honour*, and *happiness*, not to *birth*, *dress*, *rank*, *beauty*, *fortune*, *power*, *popularity*, and the like *outward things*, but to *moral* and *truly virtuous qualities*, and to those *enjoyments* which spring from a well-informed judgment and a regular conduct of the affections, especially those of the *social* and *disinterested* kind. Such dignified forms of *beauty* and *good*, often suggested, and, by moving pictures and examples, warmly recommended to the *imagination*, enforced by the authority of *conscience*, and demonstrated by *reason* to be the surest means of enjoyment, and the only independent, undeprivable, and durable goods, will be the best counterbalance to meaner passions, and the firmest foundation and security to virtue.

It is of great importance to the forming a *just taste*, or pure and large conceptions of happiness, to study and understand *human nature* well, to remember what a complicated system it is, particularly to have deeply imprinted on our mind that GRADATION of *senses*, *faculties*, and *powers of enjoyment* formerly mentioned, and the *subordination* of *goods* resulting from thence, which nature points out, and the experience of mankind confirms. Who, when they think seriously, and are not under the immediate influence of some violent prejudice or passion, prefer not the pleasures of *action*, *contemplation*, *society*, and most *exercises* and *joys* of the *moral* kind, as *friendship*, *natural affection*, and the like, to all *sensual gratifications* whatsoever? Where the different species of pleasure are blended into *one complex form*, let them be accurately distinguished, and be referred each to its proper *faculty* and *sense*, and examined apart what they have peculiar, what common with others, and what foreign and adventitious. Let *wealth*, *grandeur*, *luxury*, *love*, *fame*, and the like, be tried by this test, and their true alloy will be found out. Let it be farther considered, whether the mind may not be easy and enjoy itself greatly, though it want many of those elegancies and superfluities of life which some possess, or that load of wealth and power which others eagerly pursue, and under which they groan. Let the difficulty of attaining, the precariousness of possessing, and the many abatements in enjoying overgrown wealth and envied greatness, of which the weary possessors so frequently complain, as the hurry of business, the burden of company, of paying attendance to the *few*, and giving it to the *many*, the cares of keeping, the fears of

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By a sound
and natural
education.

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By rightly
studying
human na-
ture.

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By compa-
ring the
moment
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ments of
different
goods.

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of losing, and the desires of increasing what they have, and the other troubles which accompany this pitiful drudgery and pompous servitude; let these and the like circumstances be often considered, that are conducive to the removing or lessening the *opinion* of such goods, and the attendant *passion* or *set* of *passions* will decay of course

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By observ-
ing our own
bent and
character,
&c.

Let the peculiar bent of our nature and character be observed, whether we are most inclined to form associations and relish objects of the *sensible*, *intellectual*, or *moral* kind. Let that which has the ascendant be particularly watched; let it be directed to right objects, be improved by proportioned exercises, and guarded by proper checks from an opposite quarter. Thus the *sensible* turn may be exalted by the *intellectual* and a taste for the beauty of the *fine arts*, and both may be made subservient to convey and rivet sentiments highly *moral* and *public-spirited*. This inward survey must extend to the *strength* and *weaknesses* of one's *nature*, one's *conditions*, *connections*, *habitudes*, *fortune*, *studies*, *acquaintance*, and the other circumstances of one's life, from which every man will form the justest estimate of his own dispositions and character, and the best rules for correcting and improving them. And in order to do this with more advantage, let those *times* or *critical seasons* be watched when the mind is best disposed towards a change; and let them be improved by rigorous *resolutions*, *promises*, or whatever else will engage the mind to persevere in virtue. Let the *conduct*, in fine, be often reviewed, and the *causes* of its *corruption* or *improvement* be carefully observed.

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By frequent
moral exer-
cises.

It will greatly conduce to refine the *moral taste*, and strengthen the *virtuous temper*, to accustom the mind to the frequent exercise of *moral sentiments* and *determinations*, by reading *history*, *poetry*, particularly of the *picturesque* and *dramatic* kind, the study of the *fine arts*; by conversing with the most eminent for good sense and virtue; but, above all, by frequent and repeated acts of *humanity*, *compassion*, *friendship*, *politeness*, and *hospitality*. It is exercise that gives health and strength. He that reasons most frequently becomes the wisest, and most enjoys the pleasures of wisdom. He who is most often affected by objects of compassion in poetry, history, or real life, will have his soul most open to pity, and its delightful pains and duties. So he also who practises most diligently the offices of kindness and charity, will by it cultivate that disposition from whence all his pretensions to personal merit must arise, his present and his future happiness.

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By an ho-
nest em-
ployment.

An useful and honourable employment in life will administer a thousand opportunities of this kind, and greatly strengthen a sense of virtue and good affections, which must be nourished by right training, as well as our understandings. For such an employment, by enlarging one's experience, giving an habit of attention and caution, or obliging one, from necessity or interest, to keep a guard over the passions, and study the outward decencies and appearances of virtue, will by degrees produce good habit, and at length insinuate the love of virtue and honesty for its own sake.

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By viewing
men and
manners in
a fair light.

It is a great inducement to the exercise of benevolence to view *human nature* in a favourable light, to observe the characters and circumstances of mankind on the *fairest* sides, to put the best constructions on

their actions they will bear, and to consider them as the result of *partial* and *mislaken*, rather than *ill* affections, or, at worst, as the excesses of a pardonable self-love, seldom or never the effect of pure malice.

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Above all, the *nature* and *consequences* of *virtue* and *vice*, their consequences being the law of our nature and will of heaven; the light in which they appear to our supreme *Parent* and *Lawgiver*, and the reception they will meet with from him, must be often attended to. The exercises of *piety*, as *adoration*, and *praise* of the *divine* excellency, *invocation* of and *dependence* on his aid, *confession*, *thanksgiving*, and *resignation*, are habitually to be indulged, and frequently performed, not only as *medicinal*, but highly *improving* to the temper.

By confide-
rati n and
pious exer-
cises.

To conclude: it will be of admirable efficacy towards eradicating *bad* habits, and implanting *good* ones, frequently to contemplate *human life* as the great nursery of our *future* and *immortal* existence, as that *state* of *probation* in which we are to be *educated* for a *divine* life; to remember, that our *virtues* or *vices* will be *immortal* as ourselves, and influence our *future* as well as our *present* happiness,—and therefore, that every disposition and action is to be regarded as pointing beyond the *present* to an *immortal* duration.—An habitual attention to this wide and important *connection* will give a vast compass and dignity to our sentiments and actions, a noble superiority to the pleasures and pains of life, and a generous ambition to make our *virtue* as *immortal* as our *being*.

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By just
views of
human life,
and its con-
nection
with a fu-
ture.

CHAP. II. *Motives to VIRTUE from Personal HAPPINESS.*

WE have already considered our *obligations* to the practice of *virtue*, arising from the *constitution* of our nature, by which we are led to *approve* a certain order and *economy* of *affections*, and a certain *course* of *action* correspondent to it †. But, besides this, there are several motives which strengthen and secure virtue, though not themselves of a *moral* kind. These are, its *tendency to personal happiness*, and the *contrary tendency of vice*. “Personal happiness arises either from the state of a man's own mind, or from the state and disposition of external causes towards him.”

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Motives
from per-
sonal hap-
piness.
† Vide
Part I.
chap. i. iii.
&c.

We shall first examine the “tendency of virtue to happiness with respect to the state of a man's own mind.” This is a point of the utmost consequence in morals, because, unless we can convince ourselves, or show to others, that, by doing our *duty*, or fulfilling our *moral obligations*, we consult the greatest satisfaction of our own mind, or our highest interest on the whole, it will raise strong and often unsurmountable prejudices against the practice of virtue, especially whenever there arises any appearances of *opposition* between our *duty* and our *satisfaction* or *interest*. To creatures so desirous of happiness, and averse to misery, as we are, and often so oddly situated amidst contending passions and interests, it is necessary that virtue appear not only an *honourable* but a *pleasing* and *beneficent* form. And in order to justify our choice to ourselves as well as before others, we must ourselves feel and be able to avow in the face of the whole world, that her ways are ways of pleasantness, and her paths the paths of peace. This will show, beyond all contradiction,

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Happiness
of virtue
from with-
in.

Motives to ^{Virtue} tradition, that we not only approve, but can give a sufficient reason for what we do.

²¹⁰ Let any man in a cool hour, when he is disengaged from business, and undisturbed by passion (as such cool hours will sometimes happen), sit down, and seriously reflect with himself what state or temper of mind he would choose to feel and indulge, in order to be easy and to enjoy himself. Would he choose, for that purpose, to be in a constant dissipation and hurry of thought; to be disturbed in the exercise of his reason; to have various and often interfering phantoms of good playing before his imagination, soliciting and distracting him by turns, now soothing him with amusing hopes, then torturing him with anxious fears; and to approve this minute what he shall condemn the next? Would he choose to have a strong and painful sense of every petty injury; quick apprehensions of every impending evil; incessant and insatiable desires of power, wealth, honour, pleasure; an irreconcilable antipathy against all competitors and rivals; insolent and tyrannical dispositions to all below him; fawning, and at the same time envious, dispositions to all above him; with dark suspicions and jealousies of every mortal? Would he choose neither to love nor be beloved of any; to have no friend in whom to confide, or with whom to interchange his sentiments or designs; no favourite, on whom to bestow his kindness, or vent his passions; in fine, to be conscious of no merit with mankind, no esteem from any creature, no good affection to his Maker, no concern for, nor hopes of, his approbation; but, instead of all these, to hate, and know that he is hated, to condemn, and know that he is condemned by all; by the good, because he is so unlike; and by the bad, because he is so like themselves; to hate or to dread the very Being that made him; and, in short, to have his breast the seat of pride and passion, petulance and revenge, deep melancholy, cool malignity, and all the other furies that ever possessed and tortured mankind?—Would our calm inquirer after happiness pitch on such a state, and such a temper of mind, as the most likely means to put him in possession of his desired ease and self-enjoyment?

²¹¹ Or would he rather choose a serene and easy flow of thought; a reason clear and composed; a judgment unbiassed by prejudice, and undistracted by passion; a sober and well-governed fancy, which presents the images of things true, and unmixed with delusive and unnatural charms, and therefore administers no improper or dangerous fuel to the passions, but leaves the mind free to choose or reject, as becomes a reasonable creature; a sweet and sedate temper, not easily ruffled by hopes or fears, prone neither to suspicion nor revenge, apt to view men and things in the fairest lights, and to bend gently to the humours of others rather than obstinately to contend with them? Would he choose such moderation and continence of mind, as neither to be ambitious of *power*, fond of *honours*, covetous of *wealth*, nor a slave to *pleasure*; a mind of course neither elated with success, nor dejected with disappointment; such a modest and noble spirit as supports power without insolence, wears honour without pride, uses wealth without profusion or parsimony; and rejoices more in giving than in receiving pleasure; such fortitude and equanimity as rises above misfortunes, or turns them into blessings; such integrity

N° 228.

and greatness of mind, as neither flatters the vices, nor triumphs over the follies of men; as equally spurns servitude and tyranny, and will neither engage in low designs, nor abet them in others? Would he choose, in fine, such mildness and benignity of heart as takes part in all the joys, and refuses none of the sorrows, of others; stands well affected to all mankind; is conscious of meriting the esteem of all, and of being beloved by the best; a mind which delights in doing good without any shew, and yet arrogates nothing on that account; rejoices in loving and being beloved by its Maker, acts ever under his eye, resigns itself to his providence, and triumphs in his approbation?—Which of these dispositions would be his choice, in order to be contented, serene, and happy?—The *former* temper is VICE, the *latter* VIRTUE. Where *one* prevails, there MISERY prevails, and by the generality is acknowledged to prevail. Where the *other* reigns, there HAPPINESS reigns, and by the confession of mankind is acknowledged to reign. The *perfection* of either temper is *misery* or *happiness in perfection*.—THEREFORE, every approach to either extreme is an approach to misery or to happiness; i. e. every degree of vice or virtue is accompanied with a proportionable degree of misery or happiness.

The principal alleviations of a virtuous man's calamities are these:—That though some of them may have been the effect of his imprudence or weakness, yet few of them are sharpened by a sense of guilt, and none of them by a consciousness of wickedness, which surely is their keenest sting;—that they are common to him with the best of men;—that they seldom or never attack him quite unprepared, but rather guarded with a consciousness of his own sincerity and virtue, with a faith and trust in providence, and a firm resignation to its perfect orders;—that they may be improved as means of correction, or materials to give scope and stability to his virtues;—and, to name no more, they are considerably lessened, and often sweetened to him, by the general sympathy of the wise and good.

His enjoyments are more numerous, or, if less numerous, yet more intense than those of the bad man: for he shares in the joys of others by rebound; and every increase of general or particular happiness is a real addition to his own. It is true, his friendly sympathy with others subjects him to some pains which the hard-hearted wretch does not feel; yet to give a loose to it, is a kind of agreeable discharge. It is such a sorrow as he loves to indulge; a sort of pleasing anguish that sweetly melts the mind, and terminates in a self-approving joy. Though the good man may want means to execute, or be disappointed in the success of, his benevolent purposes; yet, as was formerly observed, he is still conscious of good affection, and that consciousness is an enjoyment of a more delightful favour than the greatest triumphs of successful vice. If the *ambitious*, *covetous*, or *voluptuous*, are disappointed, their passions recoil upon them with a fury proportioned to their opinion of the value of what they pursue, and their hope of success; while they have nothing within to balance the disappointment, unless it is an useless fund of pride, which, however, frequently turns mere accidents into mortifying affronts, and exalts grief into rage and frenzy. Whereas the meek, humble,

From Happiness.

The alleviations of his ills.

His enjoyments.

* See Part II. chap. ii.

Motives to humble, and benevolent temper, is its own reward, is satisfied from within; and, as it magnifies greatly the pleasure of success, so it wonderfully alleviates, and in a manner annihilates, all pain for the want of it.

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From merited esteem and sympathy.

As the good man is conscious of loving and wishing well to all mankind, he must be sensible of his deserving the esteem and good-will of all; and this supposed reciprocation of social feelings is, by the very frame of our nature, made a source of very intense and enlivening joys. By this sympathy of affections and interests, he feels himself intimately united with the human race; and, being sensibly *alive* over the whole system, his heart receives and becomes responsive to every touch given to any part. So that, as an eminent philosopher finely expresses it, he gathers contentment and delight from the pleased and happy states of those around him, from accounts and relations of such happiness, from the very countenances, gestures, voices, and sounds, even of creatures foreign to our kind, whose signs of joy and contentment he can any way discern.

§ Vide Shaftsb. Inq. into Virtue, Book II.

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Do not interfere with other joys.

Nor do those generous affections stop any other natural source of joy whatever, or deaden his sense of any innocent gratification. They rather keep the several senses and powers of enjoyment open and disengaged, intense and uncorrupted by riot or abuse; as is evident to any one who considers the dissipated, unfeeling state of men of *pleasure, ambition, or interest*, and compares it with the serene and gentle state of a mind at peace with itself, and friendly to all mankind, unruffled by any violent emotion, and sensible to every good-natured and alluring joy.

216
The misery of excess in the private passions.
* See Part I. chap. i. ii.

It were easy, by going through the different sets of affections mentioned formerly*, to show, that it is only by maintaining the proportion settled there, that the mind arrives at true repose and satisfaction. If *fear* exceeds that proportion, it sinks into melancholy and dejection. If *anger* passes just bounds, it ferments into rage and revenge, or subsides into a sullen corroding gloom, which embitters every good, and renders one exquisitely sensible to every ill. The *private* passions, the *love of honour* especially, whose impulses are more generous, as its effects are more diffusive, are instruments of private pleasure; but if they are disproportioned to our *wants*, or to the *value* of their several objects, or to the *balance* of other passions equally necessary and more amiable, they become instruments of intense pain and misery. For, being now destitute of that counterpoise which held them at a due pitch, they grow turbulent, peevish, and revengeful, the cause of constant restlessness and torment, sometimes flying out into a wild delirious joy, at other times settling in a deep splenetic grief. The concert between reason and passion is then broke: all is dissonance and distraction within. The mind is out of frame, and feels an agony proportioned to the violence of the reigning passion.

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In the public affections.

The case is much the same, or rather worse, when any of the particular *kind* affections are out of their natural order and proportion; as happens in the case of *effeminate pity, exorbitant love, parental dottage*, or any *party-passion*, where the just regards to society are supplanted. The more *social* and *disinterested* the passion is, it breaks out into the wilder excesses, and makes the more dreadful havoc both within and abroad; as

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is but too apparent in those cases where a false species of *religion, honour, zeal, or party-rage*, has seized on the natural enthusiasm of the mind, and worked it up to madness. It breaks through all ties *natural* and *civil*, disregards the most sacred and solemn obligations, silences every other affection whether *public* or *private*, and transforms the most gentle natures into the most savage and inhuman.

Whereas, the man who keeps the *balance* of affection even, is easy and serene in his motions; mild, and yet affectionate; uniform and consistent with himself; is not liable to disagreeable collisions of interests and passions; gives always place to the most friendly and humane affections, and never to dispositions or acts of resentment, but on high occasions, when the *security* of the *private*, or *welfare* of the *public* system, or the *great interests* of mankind, necessarily require a noble indignation; and even then he observes a just measure in wrath: and last of all, he proportions every passion to the value of the object he affects, or to the importance of the end he pursues.

To sum up this part of the argument, the *honest* and *good* man has eminently the advantage of the *knave* and *selfish* wretch in every respect. The pleasures which the *last* enjoys flow chiefly from external advantages and gratifications; are superficial and transitory; dashed with long intervals of satiety, and frequent returns of remorse and fear; dependent on favourable accidents and conjunctures; and subjected to the humours of men. But the *good* man is satisfied from himself; his principal possessions lie within, and therefore beyond the reach of the caprice of men or fortune; his enjoyments are exquisite and permanent; accompanied with no inward checks to damp them, and always with ideas of dignity and self-approbation; may be tasted at any time, and in any place. The gratifications of *vice* are turbulent and unnatural, generally arising from the relief of passions in themselves intolerable, and issuing in tormenting reflection; often irritated by disappointment, always inflamed by enjoyment, and yet ever cloyed with repetition. The pleasures of *virtue* are calm and natural; flowing from the exercise of kind affections, or delightful reflections in consequence of them; not only agreeable in the prospect, but in the present feeling; they never satiate nor lose their relish; nay, rather the admiration of virtue grows stronger every day; and not only is the desire but the enjoyment heightened by every new gratification; and, unlike to most others, it is increased, not diminished, by sympathy and communication.—In fine, the satisfactions of *virtue* may be purchased without a bribe, and possessed in the humblest as well as the most triumphant fortune; they can bear the strictest review, do not change with circumstances, nor grow old with time. Force cannot rob, nor fraud cheat us of them; and, to crown all, instead of abating, they enhance every other pleasure.

But the happy consequences of *virtue* are seen not only in the internal enjoyments it affords a man, but effects of “in the favourable disposition of external causes towards him, to which it contributes.”

As *virtue* gives the sober possession of one's self, and the command of one's passions, the consequence must be heart's ease, and a fine natural flow of spirits, which conduce more than any thing else to health and

From Happiness.

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Happiness of well proportioned passions.

219
Sum of the argument.

220
External effects of virtue.

221
On the body.

R r

long

²²² ^{Motives to} ^{Virtue} long life. Violent passions, and the excesses they occasion, gradually impair and wear down the machine. But the calm placid state of a temperate mind, and the healthful exercises in which *virtue* engages her faithful votaries, preserve the natural functions in full vigour and harmony, and exhilarate the spirits, which are the chief instruments of action.

²²² ^{On one's} ^{fortune, in-} ^{terest, &c.} It may by some be thought odd to assert, that *virtue* is no enemy to a man's *fortune* in the present state of things.—But if by *fortune* be meant a moderate or competent share of *wealth, power, or credit*, not overgrown degrees of them; what should hinder the virtuous man from obtaining that? He cannot cringe or fawn, it is true, but he can be civil and obliging as well as the knave; and surely his civility is more alluring, because it has more manliness and grace in it than the mean adulation of the other: he cannot cheat or undermine; but he may be cautious, provident, watchful of occasions, and equally prompt with the rogue in improving them: he scorns to prostitute himself as a pander to the passions, or as a tool to the vices, of mankind; but he may have as sound an understanding and as good capacities for promoting their real interests as the veriest court-slave: and then he is more faithful and true to those who employ him. In the common course of business, he has the same chances with the knave of acquiring a fortune, and rising in the world. He may have equal abilities, equal industry, equal attention to business; and in other respects he has greatly the advantage of him. People love better to deal with him; they can trust him more; they know he will not impose on them, nor take advantage of them, and can depend more on his word than on the oath or strongest securities of others. Whereas what is commonly called *cunning*, which is the *offspring of ignorance*, and constant companion of *knavery*, is not only a mean-spirited, but a very short-sighted talent, and a fundamental obstacle in the road of business. It may procure indeed immediate and petty gains; but it is attended with dreadful abatements, which do more than overbalance them, both as it sinks a man's credit when discovered, and cramps that largeness of mind which extends to the remotest as well as the nearest interest, and takes in the most durable equally with the most transient gains. It is therefore easy to see how much a man's *credit* and *reputation*, and consequently his success, depend on his honesty and virtue.

²²³ ^{On one's} ^{peace and} ^{security.} With regard to *security* and *peace* with his neighbours, it may be thought, perhaps, that the man of a quiet forgiving temper, and a flowing benevolence and courtesy, is much exposed to injury and affronts from every proud or peevish mortal, who has the power or will to do mischief. If we suppose, indeed, this *quietness* and *gentleness* of nature accompanied with *cowardice* and *puffillanimity*, this may often be the case; but in reality the good man is bold as a lion, and so much the bolder for being the calmer. Such a person will hardly be a butt to mankind. The ill-natured will be afraid to provoke him, and the good-natured will not incline to do it. Besides, *true virtue*, which is conducted by reason, and exerted gracefully and without parade, is a most insinuating and commanding thing; if it cannot disarm malice and resentment at once, it will wear them out by degrees, and subdue them at

length. How many have, by favours and prudently yielding, triumphed over an enemy, who would have been inflamed into tenfold rage by the fiercest opposition! In fine, *goodness* is the most universally popular thing that can be.

²²⁴ ^{On one's} ^{family.} To conclude; the good man may have some enemies, but he will have more friends; and, having given so many marks of private friendship or public virtue, he can hardly be destitute of a patron to protect, or a sanctuary to entertain him, or to protect or entertain his children when he is gone. Though he should have little else to leave them, he bequeaths them the fairest, and generally the most unenvied, inheritance of a *good name*, which, like good seed sown in the field of futurity, will often raise up unsolicited friends, and yield a benevolent harvest of unexpected charities. But should the fragrance of the parent's virtue prove offensive to a perverse or envious age, or even draw persecution on the friendless orphans, there is *one* in heaven who will be more than a father to them, and recompense their parent's virtues by showering down blessings on them.

CHAP. III. *Motives to VIRTUE from the BEING and PROVIDENCE of GOD.*

²²⁵ ^{Two exter-} ^{nal motives} ^{to virtue.} BESIDES the interesting motive mentioned in the last Chapter, there are two great motives to *virtue*, strictly connected with *human life*, and resulting from the very *constitution* of the *human mind*. The first is the BEING and PROVIDENCE of GOD; the second is the IMMORTALITY of the SOUL, with *future rewards* and *punishments*.

²²⁶ ^{Their im-} ^{portance.} It appears from Chap. iv. of Part II. that *man*, by the *constitution* of his nature, is designed to be a RELIGIOUS CREATURE. He is intimately connected with the *Deity*, and necessarily dependent on him. From that *connection* and necessary *dependence* result various *obligations* and *duties*, without fulfilling which, some of his sublimest powers and affections would be incomplete and abortive. If he be likewise an IMMORTAL creature, and if his *present conduct* shall affect his *future happiness* in another state as well as in the *present*, it is evident that we take only a *partial view* of the *creature* if we leave out this important property of his nature, and make a *partial estimate* of *human life*; if we strike out of the account, or overlook, that part of his duration which runs out into eternity.

²²⁷ ^{Piety.} It is evident from the above-mentioned Chapter, that “to have a respect to the *Deity* in our temper and conduct, to *venerate* and *love* his *character*, to *adore* his *goodness*, to *depend upon* and *reign* ourselves to his *providence*, to *seek* his *approbation*, and *act* under a *sense* of his *authority*, is a *fundamental part* of *moral virtue*, and the *completion* of the *highest destination* of our *nature*.”

²²⁸ ^{A support} ^{to virtue.} But as *piety* is an essential part of virtue, so likewise it is a *great support* and *enforcement* to the practice of it. To contemplate and admire a Being of such transcendent dignity and perfection as GOD, must naturally and necessarily open and enlarge the mind, give a freedom and ampleness to its powers, and a grandeur and elevation to its aims. For, as an excellent *divine* observes, “the greatness of an object, and the excellency of the act of any AGENT about a transcendent object,

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object, doth mightily tend to the enlargement and improvement of his faculties." Little objects, mean company, mean cares, and mean business, cramp the mind, contract its views, and give it a creeping air and deportment. But when it soars above mortal cares and mortal pursuits into the regions of divinity, and converses with the greatest and best of Beings, it spreads itself into a wider compass, takes higher flights in reason and goodness, becomes godlike in its air and manners. *Virtue* is, if one may say so, both the *effect* and *cause* of largeness of mind. It requires that one think freely, and act nobly. Now what can conduce more to freedom of thought and dignity of action, than to conceive worthily of God, to reverence and adore his unrivalled excellency, to imitate and transcribe that excellency into our own nature, to remember our relation to him, and that we are the images and representatives of his glory to the rest of the creation? Such feelings and exercises must and will make us scorn all actions that are base, unhandsome, or unworthy our state; and the relation we stand in to God will irradiate the mind with the light of wisdom, and ennoble it with the liberty and dominion of virtue.

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A guard
and en-
forcement
to virtue.

The influence and efficacy of *religion* may be considered in another light. We all know that the presence of a friend, a neighbour, or any number of spectators, but especially an august assembly of them, uses to be a considerable check upon the conduct of one who is not lost to all sense of honour and shame, and contributes to restrain many irregular sallies of passion. In the same manner we may imagine, that the awe of some superior mind, who is supposed privy to our secret conduct, and armed with full power to reward or punish it, will impose a restraint on us in such actions as fall not under the controul or animadversion of others. If we go still higher, and suppose our inmost thoughts and darkest designs, as well as our most secret actions, to lie open to the notice of the supreme and universal mind, who is both the *spectator* and *judge* of human actions, it is evident that the belief of so august a presence, and such awful inspection, must carry a restraint and weight with it proportioned to the strength of that belief, and be an additional motive to the practice of many duties which would not have been performed without it.

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Exercises
of piety
improving
to virtue.

It may be observed farther, that "to live under an habitual sense of the *Deity* and his great *administration*, is to be conversant with *wisdom*, *order*, and *beauty*, in the highest subjects, and to receive the delightful reflections and benign feelings which these excite while they irradiate upon him from every scene of nature and providence." How improving must such views be to the mind, in dilating and exalting it above those puny interests and competitions which agitate and inflame the bulk of mankind against each other!

CHAP. IV. *Motive to VIRTUE from the IMMORTALITY of the SOUL, &c.*

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Metaphy-
sical argu-
ments for
its immor-
tality.

THE other motive mentioned was the *immortality* of the soul, with *future rewards* and *punishments*. The *metaphysical* proofs of the soul's immortality are commonly drawn from—its *simple*, *uncompounded*, and *indivisible* nature; from whence it is concluded, that it can-

not be corrupted or extinguished by a dissolution or destruction of its parts:—from its having a *beginning* of *motion* within itself; whence it is inferred, that it cannot discontinue and lose its motion:—from the different properties of *matter* and *mind*, the *sluggishness* and *inactivity* of one, and the immense *activity* of the other; its prodigious flight of *thought* and *imagination*; its *penetration*, *memory*, *fore-sight*, and *anticipations* of *future*: from whence it is concluded, that a being of so divine a nature cannot be extinguished. But as these metaphysical proofs depend on intricate reasonings concerning the *nature*, *properties*, and *distinctions* of *body* and *mind*, with which we are not very well acquainted, they are not obvious to ordinary understandings, and are seldom so convincing even to those of higher reach, as not to leave some doubts behind them. Therefore perhaps it is not so safe to rest the proof of such an important article on what many may call the subtleties of school-learning. Those proofs which are brought from *analogy*, from the *moral constitution* and *phenomena* of the *human mind*, the *moral attributes* of God, and the *present course* of *things*, and which therefore are called the *moral arguments*, are the plainest, and generally the most satisfying. We shall select only one or two from the rest.

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Immortali-
ty of the
Soul.

In tracing the *nature* and *destination* of any being, we form the surest judgment from his *powers* of *action*, and the scope and *limits* of these, compared with his *state*, or with that *field* in which they are exercised. If this being passes through different states, or fields of action, and we find a *succession* of powers adapted to the different periods of his progress, we conclude that he was destined for those successive states, and reckon his nature *progressive*. If, besides the immediate set of powers which fit him for action in his present state, we observe another set which appear superfluous if he were to be confined to it, and which point to another or higher one, we naturally conclude, that he is not designed to remain in his present state, but to advance to that for which those supernumerary powers are adapted. Thus we argue, that the *insect*, which has wings forming or formed, and all the apparatus proper for flight, is not destined always to creep on the ground, or to continue in the torpid state of adhering to a wall, but is designed in its season to take its flight in air. Without this farther destination, the admirable mechanism of wings and the other apparatus would be useless and absurd. The same kind of reasoning may be applied to man, while he lives only a sort of *vegetative* life in the womb. He is furnished even there with a beautiful apparatus of organs, eyes, ears, and other delicate senses, which receive nourishment indeed, but are in a manner folded up, and have no proper exercise or use in their present confinement*. Let us suppose some intelligent spectator, who never had any connection with man, nor the least acquaintance with human affairs, to see this odd phenomenon, a creature formed after such a manner, and placed in a situation apparently unsuitable to such various machinery: must he not be strangely puzzled about the use of his complicated structure, and reckon such a profusion of art and admirable workmanship lost on the subject; or reason by way of anticipation, that a creature endued with such various yet unexerted capacities, was destined for a more enlarged

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Moral
proof from
analogy.

* Vide Lib.
dov. Viv.
Relig.
Christ.
Lib. II. de
Vita Uteri,
&c.

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sphere of action, in which those latent capacities shall have full play? The vast variety and yet beautiful symmetry and proportions of the several parts and organs with which the creature is endued, and their apt cohesion with and dependence on the curious receptacle of their life and nourishment, would forbid his concluding the whole to be the birth of chance, or the bungling effort of an unskilful artist; at least would make him demur a while at so harsh a sentence. But if, while he is in this state of uncertainty, we suppose him to see the babe, after a few successful struggles, throwing off his fetters, breaking loose from his little dark prison, and emerging into a new day, then unfolding his recluse and dormant powers, breathing in air, gazing at light, admiring colours, sounds, and all the *fair variety* of nature; immediately his doubts clear up, the propriety and excellency of the workmanship dawn upon him with full lustre, and the whole mystery of the first period is unravelled by the opening of this new scene. Though in this *second* period the creature lives chiefly a kind of *animal-life*, i. e. of *sense* and *appetite*, yet by various trials and observations he gains experience, and by the gradual evolution of the powers of *imagination* he ripens apace for an *higher* life, for exercising the arts of *design* and *imitation*, and of those in which strength or dexterity are more requisite than acuteness or reach of judgment. In the succeeding *rational* or *intellectual* period, his *understanding*, which formerly crept in a lower, mounts into an higher sphere, canvasses the natures, judges of the relations of things, forms schemes, deduces consequences from what is past, and from present as well as past collects future events. By this succession of states, and of correspondent culture, he grows up at length into a *moral*, a *social*, and a *political* creature. This is the last period at which we perceive him to arrive in this his mortal career. Each *period* is introductory to the next succeeding one; each *life* is a field of exercise and improvement for the next higher one; the life of the *fetus* for that of the *infant*, the life of the *infant* for that of the *child*, and all the lower for the highest and best. — But is this the last period of nature's progression? Is this the utmost extent of her plot, where she winds up the drama, and dismisses the actor into eternal oblivion? Or does he appear to be invested with supernumerary powers, which have not full exercise and scope even in the last scene, and reach not that maturity or perfection of which they are capable; and therefore point to some higher scene where he is to sustain another and more important character than he has yet sustained? If any such there are, may we not conclude by analogy, or in the same way of anticipation as before, that he is destined for that after-part, and is to be produced upon a more august and solemn stage, where his sublimer powers shall have proportioned action, and his nature attain its completion?

* See
Butler's
Analogy,
Part I.

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Powers in
man which
point to an
after-life.

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Intellectual.

If we attend to that *curiosity*, or prodigious *thirst* of *knowledge*, which is natural to the mind in every period of its progress, and consider withal the endless round of business and care, and the various hardships to which the bulk of mankind are chained down; it is evident, that in this present state it is impossible to expect the gratification of an appetite at once so insatiable and so noble. Our *senses*, the ordinary organs by

which knowledge is let into the mind, are always imperfect, and often fallacious; the advantages of assisting or correcting them are possessed by few; the difficulties of finding out truth amidst the various and contradictory opinions, interests, and passions of mankind, are many; and the wants of the creature, and of those with whom he is connected, numerous and urgent: so that it may be said of most men, that their *intellectual* organs are as much shut up and secluded from proper nourishment and exercise in that little circle to which they are confined, as the bodily organs are in the womb. Nay, those who to an aspiring genius have added all the assistances of art, leisure, and the most liberal education, what narrow prospects can even they take of this unbounded scene of things from that little eminence on which they stand? and how eagerly do they still grasp at new discoveries, without any satisfaction or limit to their ambition?

But should it be said, that man is made for *action*, and not for *speculation*, or fruitless searches after knowledge, we ask, For what kind of action? Is it only for bodily exercises, or for *moral*, *political*, and *religious* ones? Of all these he is capable; yet, by the unavoidable circumstances of his lot, he is tied down to the *former*, and has hardly any leisure to think of the *latter*, or, if he has, wants the proper instruments of exerting them. The *love of virtue*, of *one's friends* and *country*, the *generous sympathy with mankind*, and *heroic zeal of doing good*, which are all so *natural* to great and good minds, and some traces of which are found in the lowest, are seldom united with proportioned means or opportunities of exercising them: so that the *moral* spring, the noble energies and impulses of the mind, can hardly find proper scope even in the most fortunate condition; but are much depressed in some, and almost entirely restrained in the generality, by the numerous clogs of an indigent, sickly, or embarrassed life. Were such mighty powers, such god-like affections, planted in the human breast to be folded up in the narrow womb of our present existence, never to be produced into a more *perfect* life, nor to expatiate in the ample career of immortality?

Let it be considered, at the same time, that no possession, no enjoyment, within the round of mortal things, is commensurate to the desires, or adequate to the capacities, of the mind. The most exalted condition has its abatements; the happiest conjuncture of fortune leaves many wishes behind; and, after the highest gratifications, the mind is carried forward in pursuit of new ones without end. Add to all, the fond *desire of immortality*, the secret *dread of non-existence*, and the high unremitting *pulse* of the soul beating for *perfection*, joined to the improbability or the impossibility of attaining it *here*; and then judge whether this elaborate structure, this magnificent apparatus of inward powers and organs, does not plainly point out an *hereafter*, and *intimate eternity* to man? Does nature give the finishing touches to the lesser and ignobler instances of her skill, and raise every other creature to the maturity and perfection of his being; and shall she leave her principal workmanship unfinished? Does she carry the *vegetative* and *animal* life in man to their full vigour and highest destination; and shall she suffer his *intellectual*, his *moral*, his *divine* life,

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Soul.

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Moral
Powers.

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Unsatisfied
desires of
existence
and happiness.

Motives to Virtue to fade away, and be for ever extinguished? Would such abortions in the *moral* world be congruous to that *perfection of wisdom and goodness* which upholds and adorns the *natural*?

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Therefore man immortal.

We must therefore conclude from this detail, that the *present state*, even at its best, is only the womb of man's being, in which the noblest principles of his nature are in a manner fettered, or secluded from a correspondent sphere of action; and therefore destined for a future and unbounded state, where they shall emancipate themselves, and exert the fulness of their strength. The most accomplished mortal, in this low and dark apartment of nature, is only the *rudiments* of what he shall be when he takes his ethereal flight, and puts on immortality. Without a reference to that state, *man* were a mere abortion, a rude unfinished embryo, a monster in nature. But this being once supposed, he still maintains his rank of the masterpiece of the creation; his latent powers are all suitable to the *harmony and progression* of nature; his noble aspirations, and the pains of his dissolution, are his efforts towards a *second birth*, the pangs of his delivery into light, liberty, and perfection; and *death*, his discharge from gaol, his separation from his fellow-prisoners, and introduction into the assembly of those heroic spirits who are gone before him, and of their great eternal Parent. The fetters of his mortal coil being loosened, and his prison walls broke down, he will be bare and open on every side to the admission of *truth and virtue*, and their fair attendant *happiness*; every *vital and intellectual* spring will evolve itself with a divine elasticity in the free air of heaven. He will not then peep at the universe and its glorious Author through a dark grate or a gross medium, nor receive the reflections of his glory through the strait openings of sensible organs; but will be *all eye, all ear, all ethereal and divine feeling*.

* *Vide Religion of Nature, § 9.* Let one part, however, of the analogy be attended to: That as in the womb we receive our original constitution, form, and the essential *stamina* of our being, which we carry along with us into the light, and which greatly affect the succeeding periods of our life; so our temper and condition in the *future life* will depend on the conduct we have observed, and the character we have formed, in the *present life*. We are *here in miniature* what we shall be at *full length hereafter*. The first *rude sketch* or *out-lines* of *reason and virtue* must be drawn at present, to be afterwards enlarged to the *stature and beauty* of angels.

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Immortality a guard and incentive to virtue.

This, if duly attended to, must prove not only a *guard*, but an admirable *incentive* to virtue. For he who faithfully and ardently follows the light of knowledge, and pants after higher improvements in virtue, will be wonderfully animated and inflamed in that pursuit by a full conviction that the scene does not close with life—that his struggles, arising from the weakness of nature and the strength of habit, will be turned into triumphs—that his career in the tract of wisdom and goodness will be both swifter and smoother—and those generous ardours with which he glows towards *heaven*, i. e. the *perfection and immortality of virtue*, will find their adequate object and exercise in a sphere proportionably enlarged, incorruptible, immortal. On the other hand, what an inexpressible damp must it be to the good man, to dread the total extinction of that

light and virtue, without which *life*, nay, *immortality* itself, were not worth a single wish?

Many writers draw their proofs of the immortality of the soul, and of a future state of rewards and punishments, from the unequal distribution of these here. It cannot be dissembled that wicked men often escape the *outward* punishment due to their crimes, and do not feel the *inward* in that measure their demerit seems to require, partly from the callousness induced upon their nature by the habits of vice, and partly from the dissipation of their minds abroad by pleasure or business—and sometimes good men do not reap all the natural and genuine fruits of their virtue, through the many unforeseen or unavoidable calamities in which they are involved. To the smallest reflection, however, it is obvious, that the natural tendency of virtue is to produce happiness; that if it were universally practised, it would, in fact, produce the greatest sum of happiness of which human nature is capable; and that this tendency is defeated only by numerous individuals, who, forsaking the laws of virtue, injure and oppress those who steadily adhere to them. But the natural tendency of virtue is the result of that constitution of things which was established by God at the creation of the world. This being the case, we must either conclude, that there will be a future state, in which all the moral obliquities of the present shall be made straight; or else admit, that the designs of infinite wisdom, goodness, and power, can be finally defeated by the perverse conduct of human weakness.—But this last supposition is so extravagantly absurd, that the reality of a future state, the only other possible alternative, may be pronounced to have the evidence of perfect demonstration.

Virtue has present rewards, and *vice* present punishments annexed to it; such rewards and punishments as make *virtue*, in most cases that happen, far more eligible than *vice*: but, in the infinite variety of human contingencies, it may sometimes fall out, that the inflexible practice of virtue shall deprive a man of considerable advantages to himself, his family, or friends, which he might gain by a well-timed piece of roguery; suppose by betraying his trust, voting against his conscience, selling his country, or any other crime where the security against discovery shall heighten the temptation. Or, it may happen, that a strict adherence to his honour, to his religion, to the cause of liberty and virtue, shall expose him, or his family, to the loss of every thing, nay, to poverty, slavery, death itself, or to torments far more intolerable. Now what shall secure a man's virtue in circumstances of such trial? What shall enforce the obligations of conscience against the allurements of so many interests, the dread of so many and so terrible evils, and the almost unsurmountable aversion of human nature to excessive pain! The conflict is the greater, when the circumstances of the crime are such as easily admit a variety of alleviations from *necessity, natural affection, love to one's family or friends*, perhaps in indigence: these will give it even the air of virtue. Add to all, that the crime may be thought to have few bad consequences,—may be easily concealed,—or imagined possible to be retrieved in a good measure by future good conduct. It is obvious to which side most men will lean in such a case; and how much need there is of a balance in the:

From the Immortality of the Soul.

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Proof from the inequality of present distributions.

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Belief of immortality, &c. a great support amidst trials.

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In the ge-
neral course
of life.

the opposite scale, from the consideration of a *God*, of a *Providence*, and of an *immortal state of retribution*, to keep the mind firm and uncorrupt in those or like instances of singular trial or distress.

But without supposing such peculiar instances, a sense of a governing Mind, and a persuasion that virtue is not only befriended by him here, but will be crowned by him hereafter with rewards suitable to its nature, vast in themselves, and immortal in their duration, must be not only a mighty support and incentive to the practice of virtue, but a strong barrier against vice. The thoughts of an Almighty Judge, and of an impartial future reckoning, are often alarming, inexpressibly so, even to the stoutest offenders. On the other hand, how supporting must it be to the good man, to think that he acts under the eye of his friend, as well as judge! How improving, to consider the *present state* as connected with a *future one*, and every relation in which he stands as a *school of discipline* for his *affections*; every *trial* as the *exercise* of some *virtue*; and the virtuous deeds which result from both, as introductory to higher scenes of *action* and *enjoyment*! Finally, how transporting is it to view *death* as his *discharge* from the *warfare* of *mortality*, and a triumphant *entry* into a state of freedom, security, and perfection, in which knowledge and wisdom shall break upon him from every quarter; where each faculty shall have its proper object; and his virtue, which was often damped or defeated here, shall be enthroned in undisturbed and eternal empire!

On reviewing this short *system* of *morals*, and the *motives* which support and enforce it, and comparing both with the *CHRISTIAN scheme*, what *light* and *vigour*

do they borrow from thence! How clearly and fully does *CHRISTIANITY* lay open the *connections* of our nature, both *material* and *immaterial*, and *future* as well *present*! What an ample and beautiful detail does it present of the *duties* we owe to *God*, to *society*, and *ourselves*, promulgated in the most simple, intelligible, and popular manner; divested of every partiality of sect or nation; and adapted to the general state of mankind! With what bright and alluring *examples* does it illustrate and recommend the practice of those *duties*; and with what mighty *sanctions* does it enforce that practice! How strongly does it describe the *corruptions* of our nature; the *deviations* of our life from the *rule of duty*, and the *causes* of both! How marvellous and benevolent a plan of *redemption* does it unfold, by which those *corruptions* may be remedied, and our *nature* restored from its *deviations* to transcendent heights of *virtue* and *piety*! Finally, what a fair and comprehensive prospect does it give us of the *administration* of *God*, of which it represents the *present state* only as a *small period*, and a *period of warfare and trial*! How solemn and unbounded are the scenes which it opens beyond it! the *resurrection* of the *dead*, the *general judgment*, the *equal distribution* of *rewards* and *punishments* to the *good* and the *bad*; and the full *completion* of *divine wisdom* and *goodness* in the *final establishment* of *order*, *perfection*, and *happiness*! How glorious then is that *SCHEME* of *RELIGION*, and how worthy of *affection* as well as of *admiration*, which, by making such *discoveries*, and affording such *assurances*, has disclosed the unfading fruits and triumphs of *VIRTUE*, and secured its interests beyond the power of *TIME* and *CHANCE*.

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Immortality of the
Soul.

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Advantages of the
Christian scheme,
and its connection
with natural religion
or morality

M O R

Moral
||
Morant.

MORAL Sense, that whereby we perceive what is good, virtuous, and beautiful, in actions, manners, and characters. See *MORAL Philosophy*.

MORALITY. See *MORAL Philosophy*.

MORANT (Philip), a learned and indefatigable antiquary and biographer, son of Stephen Morant, was born at St Saviour's in the isle of Jersey, October 6. 1700; and, after finishing his education at Abingdon school, was entered December 16th, 1717 at Pembroke college Oxford, where he took the degree of B. A. June 10th, 1721, and continued till midsummer 1722; when he was preferred to the office of preacher of the English church at Amsterdam, but never went to take possession. He took the degree of M. A. in 1724, and was presented to the rectory of Shellow Bowells, April 20th 1733; to the vicarage of Bromfield, January 17th 1733-4; to the rectory of Chicknal Smeley, September 19th, 1735; to that of St Mary's, Colchester, March 9th, 1737; to that of Wickham Bishop's, January 21st, 1742-3; and to that of Aldham, September 14th, 1745. All these benefices are in the county of Essex. In 1748 he published his *History of Colchester*, of which only 200 copies were printed. In 1751 he was elected F. S. A.; and in February 1768 he was appointed by the lords sub-committees of the house of peers to succeed Mr Blyke in preparing for the press a copy of the rolls of parliament; a service to

M O R

Morant
||
Morat.

which he diligently attended till his death, which happened November 25th, 1770. Besides the above work, and many useful translations, abridgements, and compilations, &c. he wrote, all the *Lives* in the *Biographia Britannica* marked C; also the life of Stillingfleet, which has no mark at the end: The *History of Essex*, 1760, 1768, 2 vols folio: The life of King Edward the Confessor, and about 150 sermons. He prepared the rolls of parliament as far as the 16th of Henry IV. The continuation of the task devolved upon Thomas Astle, Esq; who had married his only daughter.

MORANT-Point, the most easterly point or promontory of the island of Jamaica, in America. W. Lon. 75. 56. N. Lat. 17. 56.

MORASS, a marsh, fen, or low moist ground, which receives the waters from above without having any descent to carry them off again. Somner derives the word from the Saxon *merse*, "lake;" Salmasius from *mare*, "a collection of waters;" others from the German *marast*, "a muddy place;" and others from *marese*, of *maricetum*, à *mariscis*, i. e. rushes. See *BOG*, *FEN*, and *DRAINING*.

In Scotland, Ireland, and the north of England, they have a peculiar kind of morasses called *mosses* or *peat-mosses*, whence the country people dig their peat or turf for firing. See *Moss*.

MORAT, or *MURTEN*, a rich trading, and considerable-

Morat,
Morata.

considerable town of Swisserland, capital of a bailiwick of the same name, belonging to the cantons of Bern and Friburg, with a castle, where the bailiff resides. It is seated on the lake Morat, on the road from Avenche to Bern, 10 miles west of Bern and 10 miles north-east of Friburg. The lake is about six miles long and two broad, the country about it being pleasant and well cultivated. The lakes of Morat and Neufchatel are parallel to each other, but the latter is more elevated, discharging itself by means of the river Broye into the lake of Neufchatel. According to M. de Luc, the former is 15 French feet above the level of Neufchatel lake; and both these lakes, as well as that of Bienne, seem formerly to have extended considerably beyond their present limits, and from the position of the country appear to have been once united. Formerly the large fish named *silurus glanis*, or the saluth, frequented these lakes, but has not been caught in them for a long time past. The environs of this town and lake were carefully examined by Mr Coxe during his residence in Switzerland, who made several excursions across the lake to a ridge of hills situated betwixt it and Neufchatel. Here are many delightful prospects; particularly one from the top of mount Vuilly, which, he says, is perhaps the only central spot from which the eye can at once comprehend the vast amphitheatre formed on one side by the Jura stretching from the environs of Geneva as far as Bâle, and, on the other, by that stupendous chain of snowy Alps which extend from the frontiers of Italy to the confines of Germany, and is lost at each extremity in the horizon. Morat is celebrated for the obstinate defence it made against Charles the Bold, duke of Burgundy, and for the battle which afterwards followed on the 22d of June 1476, where the duke was defeated, and his army almost entirely destroyed*. Not far from the town, and adjoining to the high-road, there still remains a monument of this victory. It is a square building, filled with the bones of Burgundian soldiers, who were slain at the siege and in the battle; the number of which appears to have been very considerable. There are several inscriptions in the Latin and German languages commemorating the victory.

MORATA (Olympia Fulvia), an Italian lady, distinguished for her learning, was born at Ferrara, in 1526. Her father, after teaching the belles lettres in several cities of Italy, was made preceptor to the two young princes of Ferrara, the sons of Alphonse I. The uncommon abilities he discovered in his daughter determined him to give her a very extraordinary education. Meanwhile the princess of Ferrara studying polite literature, it was judged expedient that she should have a companion in the same pursuit; and Morata being called, she was heard by the astonished courtiers to declaim in Latin, to speak Greek, and to explain the paradoxes of Cicero. Her father dying, she was obliged to return home to take upon her the management of family-affairs, and the education of her brother and three sisters; both which she executed with the greatest diligence and success. In the mean time Andrew Grunthler, a young German, who had studied physic, and taken his doctor's degree at Ferrara, fell in love with her, and married her. She now went with her husband to Germany, taking her little

brother with her, whom she instructed in the Latin and Greek tongues: and after staying a short time at Augsbourg, went to Schweinfurt in Franconia, where her husband was born: but they had not been there long before that town was unhappily besieged and burnt; however, escaping the flames, they fled in the utmost distress to Hammelburg. This place they were also obliged to quit, and were reduced to the last extremities, when the elector palatine invited Grunthler to be professor of physic at Heidelberg, and he entered on his new office in 1554; but they no sooner began to taste the sweets of repose, than a disease, occasioned by the distresses and hardships they had suffered, seized upon Morata, who died in 1555, in the 29th year of her age; and her husband and brother did not long survive her. She composed several works, great part of which were burnt with the town of Schweinfurt; the remainder, which consist of orations, dialogues, letters, and translations, were collected and published under the title of *Olympia Fulvia Morata, femina doctissima, et plane divina, opera omnia quæ hactenus inveniri potuerint; quibus Calii secundi curionis epistolæ ac orationes accesserunt*; which has had several editions in octavo.

MORAVIA, a river of Turkey in Europe, which rises in Bulgaria, runs north through Servia by Nissa, and falls into the Danube at Semendria, to the eastward of Belgrade.

MORAVIA, a marquisate of Germany, derives the name of *Mahern*, as it is called by the Germans, and of *Morawa*, as it is called by the natives, from the river of that name which rises in the mountains of the county of Glatz, and passes through the middle of it. It is bounded to the south by Austria, to the north by Glatz and Silesia, to the west by Bohemia, and to the east by Silesia and Hungary; being about 120 miles in length and 100 in breadth.

A great part of this country is over-run with woods and mountains, where the air is very cold, but much wholesomer than in the low grounds, which are full of bogs and lakes. The mountains, in general, are barren; but the more champaign parts tolerably fertile, yielding corn, with plenty of hemp and flax, good saffron, and pasture. Nor is it altogether destitute of wine, red and white, fruits, and garden-stuff. Moravia also abounds in horses, black cattle, sheep, and goats. In the woods and about the lakes there is plenty of wild fowl, game, venison, bees, honey, hares, foxes, wolves, beavers, &c. In this country are likewise quarries of marble, bastard diamonds, amethysts, alum, iron, sulphur, salt-petre, and vitriol, with wholesome mineral-waters, and warm springs; but salt is imported. Its rivers, of which the March, Morawa, or Morau, are the chief, abound with trout, crayfish, barbel, eels, perch, and many other sorts of fish.

The language of the inhabitants is a dialect of the Slavonic, differing little from the Bohemian; but the nobility and citizens speak German and French.

Moravia was anciently inhabited by the Quadi, who were driven out by the Selavi. Its kings, who were once powerful and independent, afterwards became dependent on, and tributary to, the German emperors and kings. At last, in the year 908, the Moravian kingdom was parcelled out among the Germans, Poles,

Moravia.

* See History of France.

Moravia
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Morbus.

and Hungarians. In 1086, that part of it properly called *Moravia* was declared a marquisate by the German king Henry IV. and united with Bohemia, to whose dukes and kings it hath ever since been subject. Though it is not very populous, it contains about 42 greater or walled towns, 17 smaller or open towns, and 198 market towns, besides villages, &c. The states of the country consist of the clergy, lords, knights, and burgeses; and the diets, when summoned by the regency, are held at Brunn. The marquisate is still governed by its own peculiar constitutions, under the *directorium in publicis & cameralibus*, and the supreme judicatory at Vienna. It is divided into six circles, each of which has its captain, and contributes to its sovereign about one-third of what is exacted of Bohemia. Towards the expences of the military establishment of the whole Austrian hereditary countries, its yearly quota is 1,856,490 florins. Seven regiments of foot, one of cuirassiers, and one of dragoons, are usually quartered in it.

Christianity was planted in this country in the 9th century; and the inhabitants continued attached to the church of Rome till the 15th, when they espoused the doctrine of John Huss, and threw off Popery: but after the defeat of the elector Palatine, whom they had chosen king, as well as the Bohemians, the emperor Ferdinand II. re-established popery; though there are still some Protestants in Moravia. The bishop of Olmutz, who stands immediately under the pope, is at the head of the ecclesiastics in this country. The supreme ecclesiastical jurisdiction, under the bishop, is vested in a consistory.

The commerce of this country is inconsiderable. Of what they have, Brunn enjoys the principal part. At Iglau and Trebitz are manufactures of cloth, paper, gun-powder, &c. There are also some iron-works and glass-houses in the country.

The inhabitants of Moravia in general are open-hearted, not easy to be provoked or pacified, obedient to their masters, and true to their promises; but credulous of old prophecies, and much addicted to drinking, though neither such fots or bigots as they are represented by some geographers. The boors, indeed, upon the river Hank, are said to be a thievish, unpolished, brutal race. The sciences now begin to lift up their heads a little among the Moravians, the university of Olmutz having been put on a better footing; and a riding academy, with a learned society, have been lately established there.

MORAVIAN BRETHREN. See HERNHUTTERS, and UNITAS *Fratrium*.

MORAW, or MORAVA, a large river of Germany, which has its source on the confines of Bohemia and Silesia. It crosses all Moravia, where it waters Olmutz and Hradisch, and receiving the Taya from the confines of Lower Hungary and Upper Austria, separates these two countries as far as the Danube, into which it falls.

MORBID, among physicians, signifies "diseased or corrupt;" a term applied either to an unsound constitution, or to those parts or humours that are affected by a disease.

MORBUS COMITIALIS, a name given to the epilepsy; because if on any day when the people were

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assembled in *comitia* upon public business, any person suddenly seized with this disorder should fall down, the assembly was dissolved, and the business of the *comitia*, however important, was suspended. See COMITIA.

MORBUS *Regius*, the same with the JAUNDICE. See MEDICINE *Index*.

MORBUS, or *Disease*, in botany. See VARIETAS.

MORDAUNT (Charles), earl of Peterborough, a celebrated commander both by sea and land, was the son of John Lord Mordaunt viscount Avalon, and was born about the year 1658. In 1675 he succeeded his father in his honours and estate. While young he served under the admirals Torrington and Narborough in the Mediterranean against the Algerines; and in 1680 embarked for Africa with the earl of Plymouth, and distinguished himself at Tangier when it was besieged by the Moors. In the reign of James II. he voted against the repeal of the test act; and disliking the measures of the court, obtained leave to go to Holland to accept the command of a Dutch squadron in the West Indies. He afterwards accompanied the prince of Orange into this kingdom; and upon his advancement to the throne, was sworn of the privy-council, made one of the lords of the bedchamber to his majesty, also first commissioner of the treasury, and advanced to the dignity of earl of Monmouth. But in November 1690 he was dismissed from his post in the treasury. On the death of his uncle Henry earl of Peterborough in 1697, he succeeded to that title; and, upon the accession of Queen Anne, was invested with the commission of captain-general and governor of Jamaica. In 1705 he was sworn of the privy-council; and the same year declared general and commander in chief of the forces sent to Spain, and joint admiral of the fleet with Sir Cloudsley Shovel, of which the year following he had the sole command. His taking Barcelona with a handful of men, and afterwards relieving it when greatly distressed by the enemy; his driving out of Spain the duke of Anjou, and the French army, which consisted of 25,000 men, though his own troops never amounted to 10,000; his gaining possession of Catalonia, of the kingdoms of Valencia, Arragon, and the isle of Majorca, with part of Murcia and Castile, and thereby giving the earl of Galway an opportunity of advancing to Madrid without a blow; are astonishing instances of his bravery and conduct. For these important services his Lordship was declared general in Spain by Charles III. afterwards emperor of Germany; and on his return to England he received the thanks of the House of Lords. His Lordship was afterwards employed in several embassies to foreign courts, installed knight of the garter, and made governor of Minorca. In the reign of George I. he was general of all the marine forces in Great Britain, in which post he was continued by King George II. He died in his passage to Lisbon, where he was going for the recovery of his health, in 1735.—His Lordship was distinguished by his possessing various shining qualities: for, to the greatest personal courage and resolution, he added all the arts and address of a general; a lively and penetrating genius; and a great extent of knowledge upon almost every subject of importance within the compass

Mordella, More. of ancient and modern literature; hence his familiar letters, inserted among those of his friend Mr Pope, are an ornament to that excellent collection.

Plate
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MORDELLA, in zoology, a genus of insects of the coleoptera order. The antennæ are thread-shaped and serrated; the head is deflected under the neck; the pappi are clavated, compressed, and obliquely blunted; and the elytra are bent backwards near the apex. There are six species, all natives of different parts of Europe.

MORE (Sir Thomas), lord high chancellor of England, the son of Sir John More, knight, one of the judges of the King's-bench, was born in the year 1480, in Milk-street, London. He was first sent to a school at St Anthony's in Threadneedle street; and afterwards introduced into the family of cardinal Moreton, who in 1497 sent him to Canterbury college in Oxford. During his residence at the university he constantly attended the lectures of Linacre and Grocinius, on the Greek and Latin languages. Having in the space of about two years made considerable proficiency in academical learning, he came to New-inn in London, in order to study the law; whence, after some time, he removed to Lincoln's-inn, of which his father was a member. Notwithstanding his application to the law, however, being now about 20 years old, he was so bigotted to monkish discipline, that he wore a hair-shirt next his skin, frequently fasted, and often slept on a bare plank. In the year 1503, being then a burgess in parliament, he distinguished himself in the house, in opposition to the motion for granting a subsidy and three fifteenths for the marriage of Henry VII.'s eldest daughter, Margaret, to the king of Scotland. The motion was rejected; and the king was so highly offended at this opposition from a beardless boy, that he revenged himself on Mr More's father, by sending him on a frivolous pretence to the Tower, and obliging him to pay 100 l. for his liberty. Being now called to the bar, he was appointed law-reader at Furnival's inn, which place he held about three years; but about this time he also read a public lecture in the church of St Lawrence, Old Jewry, upon St Austin's treatise *De civitate Dei*, with great applause. He had indeed formed a design of becoming a Franciscan friar, but was dissuaded from it; and, by the advice of Dr Colet, married Jane, the eldest daughter of John Colt, Esq; of Newhall in Essex. In 1508 he was appointed judge of the sheriff's court in the city of London, was made a justice of the peace, and became very eminent at the bar. In 1516 he went to Flanders in the retinue of Bishop Tonstal and Dr Knight, who were sent by King Henry VIII. to renew the alliance with the archduke of Austria, afterwards Charles V. On his return, Cardinal Wolsey would have engaged Mr More in the service of the crown, and offered him a pension, which he refused. Nevertheless, it was not long before he accepted the place of master of the requests, was created a knight, admitted of the privy-council, and in 1520 made treasurer of the exchequer. About this time he built a house on the bank of the Thames, at Chelsea, and married a second wife. This wife, whose name was *Middleton*, and a widow, was old, ill-tempered, and covetous; nevertheless Erasmus says he was as fond of her as if she were a young maid.

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In the 14th year of Henry VIII. Sir Thomas More was made speaker of the house of commons: in which capacity he had the resolution to oppose the then powerful minister, Wolsey, in his demand of an oppressive subsidy; notwithstanding which, it was not long before he was made chancellor of the duchy of Lancaster, and was treated by the king with singular familiarity. The king having once dined with Sir Thomas at Chelsea, walked with him near an hour in the garden, with his arm round his neck. After he was gone, Mr Roper, Sir Thomas's son-in-law, observed how happy he was to be so familiarly treated by the king: to which Sir Thomas replied, "I thank our lord, son Roper, I find his grace my very good lord indeed, and believe he doth as singularly favour me as any subject within this realm: howbeit, I must tell thee, I have no cause to be proud thereof; for if my head would win him a castle in France, it would not fail to go off." From this anecdote it appears, that Sir Thomas knew his grace to be a villain.

In 1526 he was sent, with Cardinal Wolsey and others, on a joint embassy to France, and in 1529 with Bishop Tonstal to Cambray. The king, it seems, was so well satisfied with his services on these occasions, that in the following year, Wolsey being disgraced, he made him chancellor; which seems the more extraordinary, when we are told that Sir Thomas had repeatedly declared his disapprobation of the king's divorce, on which the great *defensor fidei* was so positively bent. Having executed the office of chancellor about three years, with equal wisdom and integrity, he resigned the seals in 1533, probably to avoid the danger of his refusing to confirm the king's divorce. He now retired to his house at Chelsea; dismissed many of his servants; sent his children with their respective families to their own houses (for hitherto he had, it seems, maintained all his children, with their families, in his own house, in the true style of an ancient patriarch); and spent his time in study and devotion: but the capricious tyrant would not suffer him to enjoy this tranquillity. Though now reduced to a private station, and even to indigence, his opinion of the legality of the king's marriage with Anne Boleyn was deemed of so much importance, that various means were tried to procure his approbation; but all persuasion proving ineffectual, he was, with some others, attainted in the house of lords of misprision of treason, for encouraging Elizabeth Barton, the nun of Kent, in her treasonable practices. His innocence in this affair appeared so clearly, that they were obliged to strike his name out of the bill. He was then accused of other crimes, but with the same effect; till, refusing to take the oath enjoined by the act of supremacy, he was committed to the Tower, and, after 15 months imprisonment, was tried at the bar of the King's-bench, for high treason, in denying the king's supremacy. The proof rested on the sole evidence of Rich the solicitor-general, whom Sir Thomas, in his defence, sufficiently discredited; nevertheless the jury brought him in guilty, and he was condemned to suffer as a traitor. The merciful Harry, however, indulged him with simple decollation; and he was accordingly beheaded on Tower-hill, on the 5th of July 1535. His body, which was first interred in the Tower, was begged by his daughter Margaret,

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and deposited in the chancel of the church at Chelsea, where a monument, with an inscription written by himself, had been some time before erected. This monument with the inscription is still to be seen in that church. The same daughter, Margaret, also procured his head after it had remained 14 days upon London-bridge, and placed it in a vault belonging to the Roper's family, under a chapel adjoining to St Dunstan's church in Canterbury. Sir Thomas More was a man of some learning, and an upright judge; a very priest in religion, yet cheerful, and even affectedly witty (A). He wanted not sagacity, where religion was out of the question; but in that his faculties were so enveloped, as to render him a weak and credulous enthusiast. He left one son and three daughters; of whom MARGARET, the eldest, was very remarkable for her knowledge of the Greek and Latin languages. She married a Mr Roper of Well-hall in Kent, whose *Life of Sir Thomas More* was published by Mr Hearne at Oxford in 1716. Mrs Roper died in 1544; and was buried in the vault of St Dunstan's in Canterbury, with her father's head in her arms.

Sir Thomas was the author of various works, though his *Utopia* is the only performance that has survived in the esteem of the world; owing to the rest being chiefly of a polemic nature: his answer to Luther has only gained him the credit of having the best knack of any man in Europe, at calling bad names in good Latin. His English works were collected and published by order of Queen Mary, in 1557; his Latin, at Basil, in 1563, and at Louvain in 1566.

MORE (Sir Antonio), an eminent painter, was born at Utrecht in 1719. He became a scholar of John Schorel, but seems to have studied the manner of Holbein, to which he approached nearer than to the freedom of design in the works of the great masters that he saw at Rome. Like Holbein he was a close imitator of nature, but did not arrive at his extreme delicacy of finishing; on the contrary, Antonio sometimes struck into a bold and masculine style, with a good knowledge of the *chiaro scuro*. In 1522, he drew Philip II. and was recommended by cardinal Granvelle to Charles V. who sent him to Portugal, where he painted John III. the king, Catherine of Austria his queen, and the infanta Mary first wife of Philip. For these three pictures he received 600 ducats, besides a gold chain of 1000 florins, and other presents. He had 100 ducats for his common portraits. But still ampler rewards were bestowed on him when sent into England, to draw the picture of queen Mary, the intended bride of Philip. They gave him 100 l. a gold chain, and a pension of 100 l. a quarter as painter to their majesties. He made various portraits of the queen; one was sent by cardinal Granvelle to the emperor, who ordered 200 florins to

Antonio. He remained in England during the reign of Mary, and was much employed; but having neglected, as is frequent, to write the names on the portraits he drew, most of them have lost part of their value, by our ignorance of the persons represented. On the death of the queen, More followed Philip into Spain, where he was indulged in so much familiarity, that one day the king flapping him pretty roughly on the shoulder, More returned the sport with his hand-flick; a strange liberty (Mr Walpole observes), to be taken with a Spanish monarch, and with such a monarch! A grandee interposed for his pardon, and he was ordered to retire to the Netherlands; but a messenger was dispatched to recal him before he had finished his journey. The painter, however, sensible of the danger he had escaped, modestly excused himself, and proceeded. At Utrecht, he found the duke of Alva, and was employed by him to draw several of his mistresses, and was made receiver of the revenues of West Flanders; a preferment with which they say he was so elated, that he burned his easel, and gave away his painting tools. More was a man of a stately and handsome presence; and often went to Brussels, where he lived magnificently. At what time or where he was knighted, is uncertain. He died at Antwerp in 1575, in the 56th year of his age. His portrait, painted by himself, is in the chamber of painters at Florence, with which the great duke, who bought it, was so pleased, that he ordered a cartel with some Greek verses, written by Antonio Maria Salvini his Greek professor, to be affixed to the frame. Another picture of himself, and one of his wife, were in the collection of Sir Peter Lely. King Charles had five pictures painted by this master. Mr Walpole mentions a number of others that are in England. But More did not always confine himself to portraits. He painted several historic pieces, particularly one much esteemed of the resurrection of Christ with two angels, and another of Peter and Paul. A painter, who afterwards sold it to the prince of Condé, got a great deal of money by showing it at the foire St Germain. He made a fine copy of Titian's Danae for the king; and left unfinished the Circumcision, designed for the altar in the church of our Lady at Antwerp.

MORE (Henry), an eminent English divine and philosopher, in the 17th century, was educated at Eton school, and in Christ-college in Cambridge, of which he became a fellow, and spent his life in a retired way, publishing a great number of excellent works. He refused bishoprics both in Ireland and England. He was an open-hearted sincere Christian philosopher, who studied to establish men in the belief of providence against atheism. Mr Hobbes was used to say, that if his own philosophy was not true, there was

none

(A) This last disposition, we are told, he could not restrain even at his execution. The day being come, he ascended the scaffold, which seemed so weak that it was ready to fall; whereupon, "I pray (said he) see me safe up, and for my coming down let me shift for myself." His prayers being ended, he turned to the executioner, and with a cheerful countenance said, "Pluck up thy spirits, man, and be not afraid to do thy office; my neck is very short, take heed therefore thou strike not awry for saving thy honesty." Then laying his head upon the block, he bid him stay until he had put aside his beard, saying, "That had never committed any treason."

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none that he should sooner like than our philosopher's. His writings have been published together in Latin and English, folio.

MORE (Alexander), was born at Castros in 1616. His father was a Scotsman, and principal of the college which the Calvinists had in that city. Alexander was sent to Geneva, where he was made professor of Greek and of Theology, and at the same time discharged the office of a pastor. His violent love of women, and the irregularity of his conduct, excited a great number of enemies against him. Saumaize, informed of his disagreeable situation, invited him to Holland, where he was first appointed professor of Theology at Middleburgh, and afterwards professor of history at Amsterdam. The duties of these stations he discharged with great ability; and in 1655 he went to Italy, where he remained a considerable time. It was during his travels in Italy that he published his beautiful poem on the defeat of the Turkish fleet by the Venetians; and this work procured him the present of a golden chain from the republic. Having taken a dislike to Holland, he was translated to Charenton. There his sermons attracted a numerous audience, not so much for their eloquence as for the satirical allusions and witticisms with which they abounded. This kind of style succeeded with him, because it was natural; but in his imitators it appeared altogether ridiculous. The impetuosity of his character brought him into new quarrels, especially with Daillé, who had greatly the better of him in the dispute.— This singular man died at Paris September 20th, 1670, aged 54, in the house of the dukes de Rohan. He was never married. His works are, 1. A Collection of Controversial Tracts. 2. Beautiful Orations and Poems, in Latin. 3. An answer to Milton, intitled, *Alexandri Mori fides publica*. Milton has attacked him with great severity in his writings. Those sermons of his which are published, by no means justify the reputation which he had acquired for that kind of composition.

MOREA, formerly called the *Peloponnesus*, is a peninsula to the south of Greece, to which it is joined by the isthmus of Corinth. Its form resembles a mulberry-leaf, and its name is derived from the great number of mulberry-trees which grow there. It is about 180 miles in length, and 130 in breadth. The air is temperate, and the land fertile, except in the middle, where it is full of mountains, and is watered by a great number of rivers. It is divided into three provinces; Scania, Belvedera, and Brazzo-di-Maina. It was taken from the Turks by the Venetians in 1687; but they lost it again in 1715. The sangiac of the Morea resides at Modon. See GREECE and PELOPONNESUS.

MOREAU (James), an eminent French physician, born at Chalons-sur-Saone, was the disciple and friend of the famous Guy Patin. He drew upon himself the jealousy and hatred of the old physicians by the public theses he maintained, and afterwards vindicated in his writings. He died in a very advanced age in 1729. He wrote in French, 1. Consultations on the Rheumatism. 2. A chemical treatise on Fevers. 3. A physical dissertation on the Dropsy; and other works which are esteemed.

MOREELSE (Paul), an eminent painter, was born at Utrecht in 1575, and studied painting under

Michael Mirevelt. He was very successful, not only in portraits, but historical subjects and architecture, particularly after he had improved his taste by his studies in Italy. We have some excellent wood-cuts in chiaro-scuro by this artist, who died in 1638.

MOREL, the name of several celebrated printers to the kings of France, who, like the Stephensses, were also men of great learning.

Frederic MOREL, who was interpreter in the Greek and Latin tongues, as well as printer to the king, was heir to Vascofan, whose daughter he had married.— He was born in Champagne, and he died in an advanced age at Paris 1583. His sons and grandsons trode in his steps; they distinguished themselves in literature, and maintained also the reputation which he had acquired by printing. The edition of *St Gregory of Nyssa*, by his son Claude Morel, is held in great estimation by the learned.

MOREL (Frederic), son of the preceding, and still more celebrated than his father, was professor and interpreter to the king, and printer in ordinary for the Hebrew, Greek, Latin, and French languages. He was so devoted to study, that when he was told his wife was at the point of death, he would not stir till he had finished the sentence which he had begun. Before it was finished, he was informed that she was actually dead; *I am sorry for it* (replied he coldly) *she was an excellent woman*. This printer acquired great reputation from the works which he published, which were very numerous and beautifully executed. From the manuscripts in the king's library, he published several treatises of St Basil, Theodoret, St Cyrille; and he accompanied them with a translation. His edition of the works of Œcumenius and Aretas, in 2 vols folio, is much esteemed. In short, after distinguishing himself by his knowledge in the languages, he died June 27, 1630, at the age of 78. His sons and grandsons followed the same profession.

MOREL (William), regius professor of Greek, and director of the king's printing house at Paris, died 1564. He composed a *Dictionnaire Grec-Latin-François*, which was published in quarto in 1622, and some other works which indicate very extensive learning. His editions of the Greek authors are exceedingly beautiful. This great scholar, who was of a different family from the preceding, had a brother named John, who died in prison (where he had been confined for heresy) at the age of 20, and whose body was dug out of the grave, and burnt Feb. 27, 1559. They were of the parish of Tilleul, in the county of Mortain, in Normandy.

MOREL (Dom Robert), a benedictine monk of the society of Saint-Maur, was born at Chaise-Dieu in Auvergne, A. D. 1653. He was appointed keeper of the library of Saint-Germain des Pres in 1680. He was afterwards superior of different religious houses. In 1699 he disengaged himself from every care, and retired to Saint Denys, where he spent his time in composing works of practical religion. This learned monk, who enjoyed from nature a lively and fruitful imagination, excelled chiefly in subjects of piety, in a knowledge of the Christian character, and of the rules which regard the conduct of the Christian life. His conversation was sprightly and refined, his answers were prompt and ingenious, his temper was gentle,

Morel.

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equable, and full of gaiety mingled with discretion. His slovenly appearance did not debase the beauty of his mind. All his words breathed charity, piety, uprightness, sincerity, and innocence of manners. Great simplicity and modesty, the limits of which he never transgressed, concealed his excellencies from the vulgar, but made him rank higher in the estimation of the wise and sensible part of mankind. Dom Morel died A. D. 1731, aged 79. His principal works are, 1. *Effusions de cœur sur chaque versé des Pseaumes et des Cantiques de l'Eglise*; Paris, 1716, in 5 vols. 12mo. P. de Tournemine, a Jesuit, esteemed this book (which abounds in pious and affecting thoughts and expressions) so much, that he perused it constantly; and when he was obliged to go to the country, he always carried a volume of it along with him. He earnestly sought to be introduced to the author, and intreated on his knees that he would grant him his benediction (*Histoire littéraire de la congrégation de Saint Maur*, p. 504.) 2. *Entretiens spirituels sur les Evangiles des Dimanches et des Mysteres de toute l'année, distribués pour tous les jours de l'Avent*, 1720, 4 vols. 12mo. 3. *Entretiens spirituels, pour servir de préparation à la Mort*, 12mo, 1721. 4. *Imitation de N. S. I. C.* a new translation, with a pathetic prayer, or an effusion of the heart, at the conclusion of every chapter, in 12mo, 1723. 5. *Méditations Chrétiennes sur les Evangiles de toute l'année*, 2 vols. 12mo, 1726. 6. *De l'Espérance Chrétienne et de la Confiance en la miséricorde de Dieu*, 12mo, 1728. The greater part of Morel's works are devotional; and his observations are drawn chiefly from the scriptures, and from the practical writings of the fathers. This circumstance greatly raised the reputation of his works, and at the same time excited the envy and ill-will of his enemies. By them he was considered as a Jansenist; and in this light he is represented in the *Dictionnaire des livres Jansenistes*.

MOREL (Andreas), a very eminent antiquary, born at Berne in Switzerland. Having a strong passion for the study of medals, he travelled through several countries, and made large collections: in 1683 he published at Paris, in 8vo, *Specimen universale rei nummarie antiquæ*: and the great work of which this was the specimen was to be a complete collection of all ancient medals, of which he had at that time 20,000 exactly designed. Soon after this essay appeared, Louis XIV. gave him a place in his cabinet of antiques, in which capacity he brought himself into great danger by speaking too freely of M. Louvois on account of the neglect in paying his salary, or on some other private account, as he was committed to the Bastille, where he lay for three years; nor was he released until the death of Louvois, nor till the canton of Berne had interceded in his favour. He afterward accepted an invitation from the count of Schwartzburg at Arnstadt, in Germany, with whom he lived in the capacity of antiquary, and was furnished with every thing necessary for carrying on his grand work. In 1703 he died; and in 1734 came out at Amsterdam part of this collection, in 2 vols. folio, under the title of *Thesaurus Morellianus, sive familiarum Romanorum numismata omnia, diligentissime undique conquesta, &c. Nunc primum edidit & commentario perpetuo illustravit Sigibertus Havercampus*. These volumes contain an explication of 3539 medals, engraved, with their reverses.

MORENA, (anc. geog.), a district or division of Mysia, in the Hither Asia. A part of which was occupied by Cleon, formerly at the head of a band of robbers, but afterwards priest of Jupiter Abrettens, and enriched with possessions, first by Antony, and then by Cæsar.

MORESBY, a harbour a little above Whitehaven, in Cumberland; in and about which many remains of antiquity have been dug up, such as altars and stones, with inscriptions on them; and several caverns have been found called Pict's Holes. Here is supposed to have been a Roman fortification.

MORESQUE, MORESK, or *Morisko*, a kind of painting, carving, &c. done after the manner of the Moors; consisting of several grotesque pieces and compartments promiscuously intermingled, not containing any perfect figure of a man, or other animal, but a wild resemblance of birds, beasts, trees, &c. These are also called *arabesques*, and are particularly used in embroideries, damask-work, &c.

MORESQUE-DANCES, vulgarly called *Morrice-dances*, are those altogether in imitation of the Moors, as farabands, chacons, &c. and are usually performed with castanets, tambours, &c.

There are few country places in England where the morrice-dance is not known. It was probably introduced about, or a little before, the reign of Henry VIII. and is a dance of young men in their shirts, with bells at their feet, and ribbands of various colours tied round their arms and flung across their shoulders.

MORETON, a town of Devonshire, with a market on Saturdays, seated on a hill, near Dartmore, and is a pretty large place, with a noted market for yarn. It is 14 miles south-west of Exeter, and 185 west by south of London. W. Long. 3. 46. N. Lat. 50. 39.

MORETON, a town in Gloucestershire, whose market is disused. It is a good thoroughfare, and seated on the Fosseway, 29 miles east-south-east of Worcester, and 83 west-north-west of London. W. Long. 1. 36. N. Lat. 52. 0.

MORGAGNA. See FATA.

MORGAGNI (John Baptist), doctor of medicine, first professor of anatomy in the university of Padua, and member of several of the most eminent societies of learned men in Europe, was born in the year 1682, at Forli, a town in the district of *La Romagna* in Italy. His parents, who were in easy circumstances, allowed him to follow that course in life his genius dictated. He began his studies at the place of his nativity; but soon after removed to Bologna, where he obtained the degree of Doctor of Medicine, when he had but just reached the 16th year of his age. Here his peculiar taste for anatomy found an able preceptor in Valsalva, who bestowed on him the utmost attention; and such was the progress he made under this excellent master, that at the age of 20 he himself taught anatomy with high reputation. Soon, however, the fame of his prelections, and the number of his pupils, excited the jealousy of the public professors, and gave rise to invidious persecutions. But his abilities and prudence gained him a complete triumph over his enemies; and all opposition to him was finally terminated from his being appointed by the senate of Bologna to fill a medical chair, which soon became vacant. But the duties of this office, although important, neither occupied

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He spent the whole of his time, nor satisfied his anxious desire to afford instruction. He still continued to labour in secret on his favourite subject, and soon after communicated the fruits of these labours to the public in his *Adversaria Anatomica*, the first of which was published in the year 1706, the second and third in 1717, and the three others in 1719. The publication of this excellent work spread the fame of Morgagni far beyond the limits of the state of Bologna. Such was his reputation, that the wise republic of Venice had no hesitation in making him an offer of the second chair of the theory of medicine in the university of Padua, then vacant by the death of M. Molinetti; and, to ensure his acceptance, they doubled the emoluments of that appointment. While he was in this department, he published his treatise, entitled *Nova institutionum medicarum idea*, which first appeared at Padua in the year 1712. From this work his former reputation suffered no diminution. And soon after he rose, by different steps, to be first professor of anatomy in that celebrated university. Although Morgagni was thus finally settled at Padua, yet he gave evident proofs of his gratitude and attachment to Bologna, which he considered as his native country with respect to the sciences. He exerted his utmost efforts in establishing the academy of Bologna, of which he was one of the first associates; and he enriched their publications with several valuable and curious papers. Soon after this, the royal societies of London and Paris received him among their number. Not long after the publication of his *Adversaria Anatomica*, he began, much upon the same plan, his *Epistole Anatomicae*, the first of which is dated at Padua in the beginning of April 1726. The works of Morgagni which have already been mentioned, are to be considered, in a great measure, as strictly anatomical: but he was not more eminent as an anatomist, than as a learned and successful physician. In the year 1760, when he was not far distant from the 80th year of his age, he published his large and valuable work *De causis et sedibus morborum per anatomen indagatis*. This last and most important of all his productions will afford convincing evidence of his industry and abilities to latest posterity. Besides these works, he published, at different periods of his life, several miscellaneous pieces, which were afterwards collected into one volume, and printed under his own eye at Padua, in the year 1765. It does not appear that he had in view any future publications; but he intended to have favoured the world with a complete edition of all his works, which would probably have been augmented with many new observations. In this he was engaged when, on the 5th of December 1771, after he had nearly arrived at the 90th year of his age, death put a period to his long and glorious career in the learned world.

MORGANA, or MORGAGNA, *Fata*. See FATA.

MORGES, a handsome and rich town of Switzerland, in the canton of Bern, and capital of a bailiwick, with a castle where the bailiff resides. It is a place of some trade on account of a canal, from which they transport merchandizes from the lake of Geneva to other parts. There is a fine prospect from it, and it is seated on the lake of Geneva, five miles from Lausanne. E. Long. 6. 42. N. Lat. 46. 29.

MORGO, anciently *Amorgos*, an island in the Archipelago, fertile in wine, oil, and corn. It is well cultivated, and the inhabitants are affable, and generally of the Greek church. The best parts belong to a monastery. The greatest inconvenience in this island is the want of wood. It is 30 miles in circumference. E. Long. 26. 15. N. Lat. 36. 30.

MORHANGE, a town of Germany, in Lorrain, whose lord has the title of Rhinegrave, and depends on the empire. It is 24 miles north-east of Nanci, and 200 east of Paris. E. Long. 6. 42. N. Lat. 48. 51.

MORHOFF (Daniel George), a very learned German, born at Wismar in the duchy of Mecklenburgh, in 1639. The duke of Holstein, when he founded an university at Kiel, made him professor of eloquence and poetry there in 1665; to which was afterwards added the professorship of history, and in 1680 the office of librarian to the university. He was the author of many works of a small kind; as orations, dissertations, theses, and poems: but his chief work was his *Polyhistor, sive de notitia auctorum et rerum commentarii*; first published at Lubec in 1688; which has been greatly enlarged since his death in 1691, and gone through several successive editions.

MORIAH, one of the eminences of Jerusalem; on which Abraham went to offer his son, and David wanted to build the temple, which was afterwards executed by Solomon: The threshing-floor of Araunah; originally narrow, so as scarce to contain the temple, but enlarged by means of ramparts; and surrounded with a triple wall, so as to add great strength to the temple, (Josephus). It may be considered as a part of Mount Sion, to which it was joined by a bridge and gallery, (*Id.*)

MORILLES, a kind of mushroom, about the bigness of a walnut, pierced with holes like a honeycomb, and said to be good for creating an appetite. They are also accounted restorative, and frequently used in sauces and ragouts.

MORILLOS (Bartholomew), of Seville in Spain, was born A. D. 1613. After having cultivated painting with success in his own country, he travelled into Italy, where he was greatly admired for a manner peculiar to himself, and capable of producing a wonderful effect. The Italians, astonished at the excellence of his genius and the freshness of his colouring, did not hesitate to compare him to the celebrated Paul Veronese. On his return to Spain, Charles II. brought him to court, with the intention of making him his first painter; but Morillos declined the offer, pretending, as an excuse, that his age would not permit him to accept of an employment of such importance. His extreme modesty, however, was the sole cause of his refusal. He died in 1685, aged 72 years.

MORIN (John Baptist), physician and regius professor of mathematics at Paris, was born at Villefranche in Beaufois in 1583. After commencing doctor at Avignon, he went to Paris, and lived with Claude Dormi bishop of Boulogne, who sent him to examine the mines of Hungary; and thereby gave occasion to his *Mundus sublunaris anatomia*, which was his first production, and published in 1619. Upon his return to his patron the bishop, he contracted an attachment to judicial

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judicial astrology, concerning which he furnished the world with many ridiculous stories, and wrote a great number of books not worth enumerating. He died in 1656, before he had finished the favourite labour of his life, which was his *Astrologia Gallica*. Louisa Maria de Gonzaga queen of Poland gave 2000 crowns to carry on the edition, at the recommendation of one of her secretaries, who was a lover of astrology; and it appeared at the Hague in 1661, in one vol. folio, with two dedications, one to Jesus Christ, and another to the queen of Poland.

MORIN (John), a very learned Frenchman, born at Blois, of Protestant parents, in 1591; but converted by cardinal du Perron to the catholic religion. He published, in 1626, some Exercitations upon the original of Patriarchs and Primates, and the ancient usage of ecclesiastical censures; dedicated to pope Urban VIII. In 1628 he undertook the edition of the Septuagint Bible, with Nobilus's version; and placed a preface before it, in which he treats of the authority of the Septuagint, and prefers the version in the edition made at Rome by order of Sixtus V. to the present Hebrew text, which he affirms has been corrupted by the Jews. About the same time he gave a French History of the deliverance of the church by the emperor Constantine, and of the temporal greatness conferred on the Roman church by the kings of France. He afterwards published Exercitations upon the Samaritan Pentateuch; and took the care of the Samaritan Pentateuch, for the Polyglot then preparing at Paris. He was greatly caressed at Rome; where, after living nine years at the invitation of cardinal Barbarini, he was recalled by Cardinal Richelieu, and died at Paris in 1659. His works are very numerous; and some of them as much valued by Protestants as Papists for the oriental learning they contain.

MORIN (Simon), a celebrated fanatic of the 17th century, was born at Richemont, near Aumale, and had been clerk to Mr Charron, general paymaster of the army. He was very ignorant and illiterate; and therefore it is no wonder if, meddling in spiritual matters, he fell into great errors. He was not content with broaching his whimsies in conversation, but wrote them down in a book, which he caused to be privately printed in 1647, under the title of *Pensées de Morin dédiées au Roi*. This book is a medley of conceit and ignorance, and contains the most remarkable errors which were afterwards condemned in the Quietists: only that Morin carries them to a greater length than any one else had done; for he affirms, "that the most enormous sins do not remove a sinner from the state of grace, but serve on the contrary to humble the pride of man." He says, "that in all sects and nations God has a number of the elect, true members of the church; that there would soon be a general reformation, all nations being just about to be converted to the true faith; and that this great reformation was to be effected by the second coming of Jesus Christ, and Morin incorporated with him."—He was in prison at Paris, at the time when Gassendi's friends were writing against the astrologer John Baptist Morin, whom they upbraided (but, as he replied, falsely) with being the brother of this fanatic. This was about 1650; after which Simon Morin was

set at liberty as a visionary; and suffered to continue so till 1661, when Des Marets de St Sorlin, who, though a fanatic and visionary himself, had conceived a violent aversion to him, discovered his whole scheme, and had him taken up. The means Des Marets made use of for this discovery was by pretending to be one of his disciples; and he carried his treachery and dissimulation so far, as to acknowledge him for "the Son of man risen again." This acknowledgement so pleased Morin, that he conferred upon him, as a particular grace, the office of being his harbinger, calling him *a real John the Baptist revived*. Then Des Marets impeached him, and became his accuser; upon which Morin was brought to a trial, and condemned to be burnt alive. This sentence was executed on him at Paris, March 14th, 1663, in the form and manner following: After having made the *amende honorable* in his shirt, with a cord about his neck and a torch in his hand, before the principal gate of the church of Notre Dame, he was carried to the place of execution, and there tied to a stake to be burnt alive, together with his book intitled *Pensées de Morin*, as also all his papers and his trial. Afterwards his ashes were thrown into the air, as a punishment for his having assumed the title of the Son of God. His accomplices, too, were condemned to assist at his execution, and then to serve in the galleys for life, after having been whipped by the hangman, and marked with a burning iron with *fleurs de lis* upon the right and left shoulders. Morin gave out that he would rise again the third day; which made many of the mob gather together at the place where he was burnt.—It is said, that when the president de Lamoignon asked him, whether it was written in any part of Scripture, that the great prophet or new Messiah should pass through the fire? he cited this text by way of answer: *Ignem me examinasti, et non est inventa in me iniquitas*; that is, "Thou hast tried me with fire, and no wickedness hath been found in me." Morin died with remarkable resolution; and it was then thought the judges had been too rigorous in their sentence, and that sending him to a mad-house would have been sufficient. They replied in defence of themselves, that Morin had owned many impious tenets; and that not in sudden starts and fits of heat, but in cool blood, and with deliberate obstinacy. But then a question will arise, whether a fool, any more than a madman, ought to be capitally punished for any opinion or degree of stubbornness?

MORIN (Peter), was born at Paris, A. D. 1531: he went into Italy, and was employed by the learned Paulus Manucius in his printing-house at Venice.—He afterwards taught Greek and cosmography at Vicenza, whence he was called to Ferrara by the duke of that name. St Charles Borromeus, informed of his profound knowledge in ecclesiastical antiquities, of his disinterestedness, of his zeal and piety, offered him his friendship, and engaged him to go to Rome in 1575. The popes Gregory XIII. and Sixtus V. employed him in an edition of the Septuagint, 1587, and in one of the Vulgate, 1590, in folio. He also spent much of his time on an edition of the Bible translated from the Septuagint, and published at Rome, 1588, in folio; on an edition of the Decretals to the time

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the time of Gregory VII. published at Rome, 1591; and on a Collection of General Councils, likewise published at Rome, 1608, 4 vols. This learned critic died at Rome, 1608, aged 77. His character was open, simple, sincere, gentle, and honest: his temper was equal and agreeable. He was an enemy to artifice and cunning; he despised riches and honours; and he seemed to have a passion for nothing but study.—He spoke Italian with as much ease and propriety as the most intelligent native. He left behind him *Un Traité du bon usage des Sciences*, and some other writings, published by Father Quetif, a Dominican friar, in 1675. His works display great research and excellent principles; and the author appears to have been well acquainted with the belles lettres and the languages. His edition of the Septuagint, printed at Rome, 1687, in folio, is now very scarce.

MORIN (Stephen), minister of the Protestant reformed religion at Caen, the place of his birth, was admitted a member of the Academy of Belles Lettres in that city, notwithstanding an express law which excluded Protestants. His great learning gained him this mark of distinction. After the revocation of the edict of Nantes, he retired to Leyden in 1685, and from that to Amsterdam, where he was appointed professor of Oriental languages. He died in 1700, at the age of 75, after being long subject to infirmities both of body and mind. He published eight dissertations in Latin relating to subjects of antiquity, which are extremely curious. The Dordrecht edition of 1700, 8vo, is the best, and preferable to that published at Geneva in 1683, 4to. He wrote likewise the life of Samuel Bochart.

MORIN (Henry), son to the preceding, was born at Saint-Pierre-Sur-Dive, in Normandy, and became a Roman Catholic after he had been a Protestant minister. He is the author of several dissertations which are to be found in the Memoirs of the Academy of Inscriptions, of which he was a member. He died at Caen, on the 16th of July 1728, aged 60, as much esteemed as his father.

MORIN (Lewis), was born at Mans in 1635. He went on foot to Paris to study philosophy, and collected herbs during the whole journey. He afterwards studied physic, and lived in the manner of an anchorite, bread and water, or at most but a few fruits, being his whole subsistence. Paris was to him a hermitage; with this exception, that it furnished him with books, and with the conversation and acquaintance of the learned. He received the degree of doctor of medicine in 1662; and, after several years practice, he was expectant at the Hotel-Dieu. His reputation made Mademoiselle de Guise choose him for her first physician, and the Academy of Sciences for one of its members. He died A. D. 1715, aged 80. A long and vigorous life, with a gentle and easy death, were the rewards of his temperance. The exercises of religion and the duties of his station occupied his whole time. No part of it was spent in paying or receiving visits. "Those who come to see me (said he) do me honour; those who do not come, lay me under an obligation." "It was only an Anthony (said Fontenelle) who could visit this Paul." He left a library valued at 20,000 crowns, an herbal, together with a cabinet of medals; and this seems to have been his

whole fortune. His mental enjoyments had been much more expensive than those of the body. An index to Hippocrates, in Greek and Latin, much more copious and better finished than that of Pinus, was found among his papers.

MORIN (John), was born at Meung near Orleans in 1705, and in 1732 he was appointed professor of philosophy at Chartres. In 1750 the bishop of Chartres rewarded his long and assiduous attention to classical learning by a canonry in the cathedral. At the age of 38, Morin published his *Mecanisme Universel*, one volume 12mo, which contains a great deal of information, but much more conjecture. His next work was a Treatise on Electricity, published in 1748. His third and last performance was an answer to the Abbé Nollet, who had attacked his opinions concerning electricity. His reputation was not limited to the province in which he lived: he was well known to the academies of sciences at Paris and Rouen, with whom he frequently corresponded. He continued his application to the sciences, and displayed the virtues of the priest and the philosopher to the last hour of his life. This valuable man died at Chartres, on the 28th of March 1764, at the age of 59.

MORINA, in botany: A genus of the monogynia order, belonging to the diandria class of plants; and in the natural method ranking under the 48th order, *Aggregate*. The corolla is unequal; the calyx of the fruit is monophyllous and dented; the calyx of the flower bifid; there is one seed under the calyx of the flower.

MORINORUM CASTELLUM (anc. geog.), simply Castellum (Antonine); situated on an eminence, with a spring of water on its top, in the territory of the Morini. Now *Mont Cassel*, in Flanders.

MORINDA, in botany: A genus of the monogynia order, belonging to the pentandria class of plants; and in the natural method ranking under the 48th order, *Aggregate*. The flowers are aggregate and monopetalous; the stigmata bifid; the fruit plums aggregate, or in clusters.

MORISON (Robert), physician and professor of botany at Oxford, was born at Aberdeen in 1620, bred at the university there, and taught philosophy for some time in it; but having a strong inclination to botany, made great progress in it. The civil wars obliged him to leave his country; which, however, he did not do till he had first signalized his zeal for the interest of the king, and his courage, in a battle fought between the inhabitants of Aberdeen and the Presbyterian troops on the bridge of Aberdeen, in which he received a dangerous wound on the head. As soon as he was cured of it, he went into France; and fixing at Paris, he applied assiduously to botany and anatomy. He was introduced to the duke of Orleans, who gave him the direction of the royal gardens at Blois. He exercised the office till the death of that prince, and afterwards went over to England in 1660. Charles II. to whom the duke of Orleans had presented him at Blois, sent for him to London, and gave him the title of his *physician*, and that of *professor royal of botany*, with a pension of 200 l. per annum. The *Prælude Botanicum*, which he published in 1669, procured him so much reputation, that the university of Oxford invited him to the professorship of botany in 1669; which

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Morisonia, which he accepted, and acquitted himself in it with great ability. He died at London in 1683, aged 63. He published a second and third part of his History of Plants, in 2 vols, folio; with this title, *Plantarum Historia Oxoniensis Universalis*. The first part of this excellent work has not been printed; and it is not known what has become of it.

MORISONIA, in botany: A genus of the polyandria order, belonging to the monadelphia class of plants; and in the natural method ranking under the 25th order, *Putamineae*. The calyx is single and bifid; the corolla tetrapetalous; there is one pistil; the berry has a hard bark, is unilocular, polyspermous, and pedicelled.

MORLACHIA, a mountainous country of Dalmatia. The inhabitants are called *Morlacks* or *Morlacchi*; they inhabit the pleasant valleys of Koter, along the rivers Kerha, Cettina, Narenta, and among the inland mountains of Dalmatia. The inhabitants are by some said to be of Walachian extraction, as (according to these authors) is indicated even by their name; Morlachia being a contraction of *Mauro-Walachia*, that is, *Black Walachia*: and the Walachians are said to be descendants of the ancient Roman colonies planted in these countries. This, however, is denied by the Abbé Fortis, who hath published a volume of travels into that country. He informs us, that the origin of the Morlacchi is involved in the darkness of barbarous ages, together with that of many other nations, resembling them so much in customs and language, that they may be taken for one people, dispersed in the vast tracks from the Adriatic sea to the frozen ocean. The emigrations of the various tribes of the Slavi, who, under the names of *Scythians*, *Geti*, *Goths*, *Hunns*, *Slavini*, *Croats*, *Avari*, and *Vandals*, invaded the Roman empire, and particularly the Illyrian provinces during the decline of the empire, must have strangely perplexed the genealogies of the nations which inhabited it, and which perhaps removed thither in the same manner as at more remote periods of time. The remainder of the *Arđizi*, *Autariati*, and other Illyrian people anciently settled in Dalmatia, who probably could not reconcile themselves to a dependence on the Romans, might nevertheless naturally enough form an union with foreign invaders not unlike themselves in dialect and customs; and, according to our author, it seems no ill-founded conjecture, that many families, driven out of Hungary by the irruption of the Moguls under Jenghiz Khan and his successors, might people the deserted valleys between the mountains of Dalmatia. This conjecture is also somewhat confirmed by the traces of the Calmuck Tartars, which are still to be found in a part of that country called *Zara*.

With regard to the etymology of the name, the Abbé observes, that the Morlacchi generally call themselves, in their own language, *Vlassi*; a national term, of which no vestige is found in the records of Dalmatia till the 13th century. It signifies *powerful men*, or *men of authority*; and the denomination of *Moro Vlassi*, corruptly *Morlacchi*, as they are now called, may perhaps point out the original of the nation. This word may possibly signify the *conquerors that came from the sea*; *Moor*, in all the dialects of the Slavonian language, signifying the *sea*.

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The Morlacchi are so different from the inhabitants of the sea-coasts in dialect, dress, dispositions, and customs, that they seem clearly to be of a different original, or at least the colonies must have settled at such distant periods from each other, that they have had time to alter in a great measure their national character. There is also a remarkable diversity among the Morlacchi themselves in several districts, probably on account of the different countries from whence they came.

With regard to the character of these people, we are informed that they are much injured by their maritime neighbours. The inhabitants of the sea coast of Dalmatia tell many frightful stories of their avarice and cruelty: but these, in our author's opinion, are all either of an ancient date, or if any have happened in latter times, they ought rather to be ascribed to the corruption of a few individuals, than to the bad disposition of the nation in general; and though thievish tricks are frequent among them, he informs us, that a stranger may travel securely through their country, where he is faithfully escorted, and hospitably treated. The greatest danger is from the *Haiduks* or *Banditti*, of whom there are great numbers among the woods and caves of these dreadful mountains on the confines. There, says our author, a man ought to get himself escorted by a couple of these "honest fellows;" for they are not capable of betraying him although a bandit; and their situation is commonly more apt to raise compassion than diffidence. They lead their life among the wolves, wandering from one precipice to another, exposed to the severity of the seasons, and frequently languish in want of the necessaries of life, in the most hideous and solitary caverns. Yet they very seldom disturb the tranquillity of others, and prove always faithful guides to travellers; the chief objects of their rapine being sheep and oxen, to supply themselves with food and shoes. Sometimes it happens, that, in their extreme necessity, the *Haiduks* go in parties to the shepherds cottages, and rudely demand something to eat; which they do not fail to take immediately by force if the least hesitation is made. It is seldom indeed that they meet with a refusal, or with resistance, as their resolution and fury are well known to be equal to the savage life they lead. Four *Haiduks* are not afraid to assault a caravan of 15 or 20 Turks, and generally plunder and put them to flight. The greatest part of the *Haiduks* look upon it as a meritorious action to shed the blood of the Turks; to which cruelty they are easily led by their natural ferocity, inflamed by a mistaken zeal for religion, and the discourses of their fanatic priests.

As to the Morlacchi themselves, they are represented as open and sincere to such a degree, that they would be taken for simpletons in any other country; and by means of this quality they have been so often duped by the Italians, that *the faith of an Italian* and *the faith of a dog*, are synonymous among the Morlacchi. They are very hospitable to strangers; and their hospitality is equally conspicuous among the rich and poor. The rich prepares a roasted lamb or sheep, and the poor with equal cordiality offers whatever he has; nor is this generosity confined to strangers, but generally extends itself to all who are in want.

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Morlachia. When a Morlack is on a journey, and comes to lodge at a friend's house, the eldest daughter of the family, or the new-married bride if there happens to be one, receives and kisses him when he alights from his horse or at the door of the house: but a foreigner is rarely favoured with these female civilities; on the contrary, the women, if they are young, hide themselves, and keep out of his way.

The Morlacchi in general have little notion of domestic oeconomy, and readily consume in a week as much as would be sufficient for several months, whenever any occasion of merriment presents itself. A marriage, the holiday of the saint, protector of the family, the arrival of relations or friends, or any other joyful incident, consumes of course all that there is to eat and to drink in the house. Yet the Morlack is a great oeconomist in the use of his wearing-apparel; for rather than spoil his new cap, he takes it off, let it rain ever so hard, and goes bareheaded in the storm. In the same manner he treats his shoes, if the road is dirty and they are not very old. Nothing but an absolute impossibility hinders a Morlack from being punctual; and if he cannot repay the money he borrowed at the appointed time, he carries a small present to his creditor, and requests a longer term. Thus it happens sometimes, that, from term to term, and present to present, he pays double what he owed, without reflecting on it.

Friendship, that among us is so subject to change on the slightest motives, is lasting among the Morlacchi. They have even made it a kind of religious point, and tie the sacred bond at the foot of the altar. The Sclavonian ritual contains a particular benediction for the solemn union of two male or two female friends in the presence of the congregation. The male friends thus united are called *Pobratimi*, and the female *Posestreme*, which mean half-brothers and half-sisters. Friendships between those of different sexes are not at this day bound with so much solemnity, though perhaps in more ancient and innocent ages it was also the custom.

From these consecrated friendships among the Morlacchi and other nations of the same origin, it should seem that the *sworn brothers* arose; a denomination frequent enough among the common people of Italy and in many parts of Europe. The difference between these and the *Pobratimi* of Morlachia consists not only in the want of the ritual ceremony, but in the design of the union itself. For, among the Morlacchi, the sole view is reciprocal service and advantage; but such a brotherhood among the Italians is generally commenced by bad men, to enable them the more to hurt and disturb society. The duties of the *Pobratimi* are, to assist each other in every case of need or danger, to revenge mutual wrongs, and such like. The enthusiasm is often carried so far as to risk and even to lose their life for the *Pobratimi*, although these savage friends are not celebrated like a Pylades. If discord happens to arise between two friends, it is talked of over all the country as a scandalous novelty; and there has been some examples of it of late years, to the great affliction of the old Morlacchi, who attribute the depravation of their countrymen to their intercourse with the Italians. Wine and strong liquors, of which the nation is beginning to make daily

abuse, will of course produce the same bad effects as *Morlachia*, among others.

But as the friendships of the Morlacchi are strong and sacred, so their quarrels are commonly unextinguishable. They pass from father to son; and the mothers fail not to put their children in mind of their duty to revenge their father if he has had the misfortune to be killed, and to show them often the bloody skirt and arms of the dead. And so deeply is revenge rooted in the minds of this nation, that all the missionaries in the world would not be able to eradicate it. A Morlack is naturally inclined to do good to his fellow-creatures, and is full of gratitude for the smallest benefit; but implacable if injured or insulted.

A Morlack who has killed another of a powerful family, is commonly obliged to save himself by flight, and to keep out of the way for several years. If during that time he has been fortunate enough to escape the search of his pursuers, and has got a small sum of money, he endeavours to obtain pardon and peace; and, that he may treat about the conditions in person, he asks and obtains a safe conduct, which is faithfully maintained, though only verbally granted. Then he finds mediators; and, on the appointed day, the relations of the two hostile families are assembled, and the criminal is introduced, dragging himself along on his hands and feet, the musket, pistol, or cutlass, with which he committed the murder, hung about his neck; and while he continues in that humble posture, one or more of the relations recites a panegyric on the dead, which sometimes rekindles the flames of revenge, and puts the poor prostrate in no small danger. It is the custom in some places for the offended party to threaten the criminal, holding all kind of arms to his throat, and, after much intreaty, to consent at last to accept of his ransom. These pacifications cost dear in Albania; but the Morlacchi make up matters sometimes at a small expence; and every-where the business is concluded with a feast at the offender's charge.

The Morlacks, whether they happen to be of the Roman or of the Greek church, have very singular ideas about religion; and the ignorance of their teachers daily augments this monstrous evil. They are as firmly persuaded of the reality of witches, fairies, enchantments, nocturnal apparitions, and sortileges, as if they had seen a thousand examples of them. Nor do they make the least doubt about the existence of vampires; and attribute to them, as in Transylvania, the sucking the blood of infants. Therefore, when a man dies suspected of becoming a vampire, or *vu-kodlak*, as they call it, they cut his hams, and prick his whole body with pins; pretending, that after this operation he cannot walk about. There are even instances of Morlacchi, who, imagining that they may possibly thirst for children's blood after death, intreat their heirs, and sometimes oblige them to promise, to treat them as vampires when they die.

The boldest Haiduk would fly trembling from the apparition of a spectre, ghost, phantom, or such like goblins as the heated imaginations of credulous and prepossessed people never fail to see. Nor are they ashamed, when ridiculed for this terror; but answer, much in the words of Pindar; "Fear that proceeds

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Morlachia. from spirits, causes even the sons of the gods to fly." The women, as may be naturally supposed, are a hundred times more timorous and visionary than the men; and some of them, by frequently hearing themselves called *witches*, actually believe they are so.

A most perfect discord reigns in Morlachia, as it generally does in other parts, between the Latin and Greek communion, which their respective priests fail not to foment, and tell a thousand little scandalous stories of each other. The churches of the Latins are poor, but not very dirty: those of the Greeks are equally poor, and shamefully ill kept. Our author has seen the curate of a Morlack village sitting on the ground in the church-yard, to hear the confession of women on their knees by his side: a strange posture indeed! but a proof of the innocent manners of those good people, who have the most profound veneration for their spiritual pastors, and a total dependence upon them; who, on their part, frequently make use of a discipline rather military, and correct the bodies of their offending flock with the cudgel. Perhaps this particular is carried to an abuse as well as that of public penance, which they pretend to inflict after the manner of the ancient church. They moreover, thro' the silly credulity of those poor mountaineers, draw illicit profits, by selling certain superstitious scrolls and other scandalous merchandise of that kind. They write in a capricious manner on the scrolls called *zapiz*, sacred names which ought not to be trifled with, and sometimes adding others very improperly joined. The virtues attributed to these *zapiz* are much of the same nature as those which the Basilians attributed to their monstrously cut stones. The Morlacchi use to carry them sewed to their caps, to cure or to prevent diseases; and they also tie them for the same purpose to the horns of their oxen. The composers of this trumpery take every method to maintain the credit of their profitable trade, in spite of its absurdity, and the frequent proofs of its inutility. And so great has their success been, that not only the Morlacchi, but even the Turks near the borders, provide themselves plentifully with *zapiz* from the Christian priests, which not a little increases their income, as well as the reputation of the commodity. The Morlacchi have also much devotion, and many of the ignorant people in Italy have little less, to certain copper and silver coins of the low empire; or to Venetian cotemporary pieces, which pass among them for medals of St Helen; and they think they cure the epilepsy and such like. They are equally fond of an Hungarian coin called *petizza*, which has the virgin and child on the reverse; and one of these is a most acceptable present to a Morlack.

The bordering Turks not only keep with devotion the superstitious *zapiz*, but frequently bring presents and cause masses to be celebrated to the images of the Virgin; which is doubtless in contradiction to the alcoran; yet when saluted, in the usual manner in that country, by the name of *Jesus*, they do not answer. Hence, when the Morlacchi, or other travellers, meet them on the confines, they do not say, *Huaglian Issus*, "Jesus be praised;" but, *Huaglian Bog*, "God be praised."

Innocence, and the natural liberty of pastoral ages, are still preserved among the Morlacchi, or at least

many traces of them remain in the places farthest distant from our settlements. Pure cordiality of sentiment is not there restrained by other regards, and displays itself without any distinction of circumstances. A young handsome Morlack girl, who meets a man of her district on the road, kisses him affectionately, without the least malice or immodest thought; and our author has seen all the women and girls, all the young men and old, kissing one another as they came into the church-yard on a holiday; so that they looked as if they had been all belonging to one family. He hath often observed the same thing on the road, and at the fairs in the maritime towns, where the Morlacchi came to sell their commodities. In times of feasting and merriment, besides the kisses, some other little liberties are taken with the hands, which we would not reckon decent, but are not minded among them; and when they are told of it, they answer, It is only toying, and means nothing. From this toying, however, their amours often take their beginning, and frequently end seriously when the two lovers are once agreed. For it very rarely happens, in places far distant from the coast, that a Morlack carries off a girl against her will, or dishonours her: and were such attempts made, the young woman would, no doubt, be able to defend herself; the women in that country being generally very little less robust than the men. But the custom is for the woman herself to appoint the time and place of being carried off; and she does so in order to extricate herself from other suitors, from whom she may have received some love-token, such as a brass ring, a little knife, or such like trifles. The Morlack women keep themselves somewhat neat till they get a husband; but after marriage they abandon themselves totally to a loathsome dirtiness, as if they intended to justify the contempt with which they are treated. Indeed it cannot be said that even the young women have a grateful odour, as they are used to anoint their hair with butter, which soon becoming rancid exhales no agreeable effluvia.

The dress of the unmarried women is the most complex and whimsical, in respect to the ornaments of the head; for when married they are not allowed to wear any thing else but a handkerchief, either white or coloured, tied about it. The girls use a scarlet cap, to which they commonly hang a veil falling down on the shoulders, as a mark of their virginity. The better sort adorn their caps with strings of silver coins, among which are frequently seen very ancient and valuable ones; they have moreover ear-rings of very curious work, and small silver chains with the figures of half moons fastened to the ends of them. But the poor are forced to content themselves with plain caps; or if they have any ornaments, they consist only of small exotic shells, round glass beads, or bits of tin. The principal merit of these caps, which constitute the good taste as well as vanity of the Morlack young ladies, is to attract and fix the eyes of all who are near them by the multitude of ornaments, and the noise they make on the least motion of their heads. Hence half-moons of silver, or of tin, little chains and hearts, false stones and shells, together with all kind of splendid trumpery, are readily admitted into their head-dress. In some districts, they fix tufts of various coloured feathers resembling two horns on their caps;

Morlachia. In others, tremulous plumes of glass; and in others, artificial flowers, which they purchase in the sea port towns; and in the variety of those capricious and barbarous ornaments, sometimes a fancy not inelegant is displayed. Their holiday-shifts are embroidered with red silk, and sometimes with gold, which they work themselves while they attend their flocks; and it is surprising to see how nicely this work is executed.— Both old and young women wear about their necks large strings of round glass-beads, of various size and colour; and many rings of brass, tin, or silver, on their fingers. Their bracelets are of leather covered with wrought tin or silver; and they embroider their stomachers, or adorn them with beads or shells. But the use of stays is unknown, nor do they put whale-bone or iron in the stomacher. A broad woollen girdle surrounds their petticoat, which is commonly decked with shells, and of blue colour, and therefore called *modrina*. Their gown, as well as petticoat, is of a kind of serge; and both reach near to the ankle: the gown is bordered with scarlet, and called *sadak*. They use no *modrina* in summer, and only wear the *sadak* without sleeves over a linen petticoat or shift.— The girls always wear red stockings; and their shoes are like those of the men, called *opanke*. The sole is of undressed ox-hide, and the upper part of sheep-skin thongs knotted, which they call *apute*; and these they fasten above the ankles, something like the ancient *cothurnus*.

The unmarried women, even of the richest females, are not permitted to wear any other sort of shoes; though after marriage they may, if they will, lay aside the *opanke*, and use the Turkish slippers. The girls keep their hair treffed under their caps, but when married they let it fall dishevelled on the breast; sometimes they tie it under the chin; and always have medals, beads, or bored coins, in the Tartar or American mode, twisted amongst it. An unmarried woman, who falls under the imputation of want of chastity, runs the risk of having her red cap torn off her head publicly in church by the curate, and her hair cut by some relation, in token of infamy. Hence, if any of them happen to have fallen into an illicit amour, they commonly of their own accord lay aside the badge of virginity, and remove into another part of the country.

Nothing is more common among the Morlacchi than marriages concluded between the old people of the respective families, especially when the parties live at a great distance, and neither see nor know each other; and the ordinary motive of these alliances is the ambition of being related to a numerous and powerful family, famous for having produced valiant men. The father of the future bridegroom, or some other near relation of mature age, goes to ask the young woman, or rather a young woman, of such a family, not having commonly any determinate choice. Upon this all the girls of the house are shown to him, and he chooses which pleases him best, though generally respecting the right of seniority. A denial in such cases is very rare; nor does the father of the maid inquire much into the circumstances of the family that asks her. Sometimes a daughter of the master is given in marriage to the servant or tenant, as was usual in patriarchal times; so little are the women regarded in

this country. On these occasions, however, the Morlacchi girls enjoy a privilege which ours would also wish to have, as in justice they certainly ought. For he who acts by proxy, having obtained his suit, is obliged to go and bring the bridegroom; and if, on seeing each other, the young people are reciprocally content, the marriage is concluded, but not otherwise. In some parts it is the custom for the bride to go to see the house and family of the proposed husband, before she gives a definitive answer; and if the place or persons are disagreeable to her, she is at liberty to annul the contract. But if she is contented, she returns to her father's house, escorted by the bridegroom and nearest relations. There the marriage day is appointed; on which the bridegroom comes to the bride's house, attended by all his friends of greatest note, who on this occasion are called *svati*, and are all armed, and on horseback, in their holiday-cloaths, with a peacock's feather in their cap, which is the distinctive ornament used by those who are invited to weddings. The company goes armed, to repulse any attack or ambush that might be intended to disturb the feast; for in old times these encounters were not unfrequent, according to the records of many national heroic songs.

The bride is conducted to a church veiled, and surrounded by the *svati* on horseback; and the sacred ceremony is performed amidst the noise of muskets, pistols, barbaric shouts and acclamations, which continue till she returns to her father's house, or to that of her husband, if not far off. Each of the *svati* has his particular inspection, as well during the cavalcade as at the marriage-feast, which begins immediately on their return from church. The *parvinaz* precedes all the rest, singing such songs as he thinks suitable to the occasion. The *bariahtar* brandishes a lance with a silken banner fastened to it, and an apple stuck on the point; there are two *bariahtars*, and sometimes four, at the more noble marriages. The *stari-svat* is the principal personage of the brigade; and the most respectable relation is commonly invested with this dignity. The *stacheo's* duty is to receive and obey the orders of the *stari-svat*. The two *diveri*, who ought to be the bridegroom's brothers when he has any, are appointed to serve the bride. The *knum* corresponds to our sponsors; and the *komorgia*, or *seksana*, is deputed to receive and guard the dowery. A *ciaous* carries the mace, and attends to the order of the march, as master of the ceremonies; he goes singing aloud, *Breberi, Davori, Dobrafrichia, Jara, Pico*; names of ancient propitious deities. *Buklia* is the cup-bearer of the company, as well on the march as at table; and all these offices are doubled, and sometimes tripled, in proportion to the number of the company.

The first day's entertainment is sometimes made at the bride's house, but generally at the bridegroom's, whither the *svati* hasten immediately after the nuptial benediction; and at the same time three or four men run on foot to tell the good news; the first who gets to the house has a kind of towel, embroidered at the ends, as a premium. The *domachin*, or head of the house, comes out to meet his daughter-in-law; and a child is handed to her, before she alights, to caress it; and if there happens to be none in the house, the child is borrowed from one of the neighbours. When she

Morlachia alights, she kneels down, and kisses the threshold.— Then the mother-in-law, or in her place some other female relation, presents a corn-sieve, full of different kinds of grain, nuts, almonds, and other small fruit, which the bride scatters upon the *svati*, by handfuls, behind her back. The bride does not sit at the great table the first day, but has one apart for herself, the two *diveri*, and the *stacheo*. The bridegroom sits at table with the *svati*; but in all that day, consecrated to the matrimonial union, he must neither unloosen or cut any thing whatever. The *knum* carves his meat, and cuts his bread. It is the *domachin's* business to give the toasts; and the *stari-svat* is the first who pledges him. Generally the *bukkara*, a very large wooden cup, goes round, first to the saint protector of the family; next to the prosperity of the holy faith; and sometimes to a name the most sublime and venerable. The most extravagant abundance reigns at these feasts; and each of the *svati* contributes, by sending a share of provisions. The dinner begins with fruit and cheese; and the soup comes last, just contrary to our custom. All sorts of domestic fowls, kid, lamb, and sometimes venison, are heaped in prodigal quantities upon their tables; but very rarely a Morlacco eats veal, and perhaps never, unless he has been persuaded to do it out of his own country. This abhorrence to calves flesh is very ancient among the Morlacchi. St Jerom, against Jovinian, takes notice of it; and Tomaso Marnavich, a Bosnian writer, who lived in the beginning of the last age, says, that the Dalmatians, uncorrupted by the vices of strangers, abstained from eating calves flesh, as an unclean food, even to his days. The women relations, if they are invited, never dine at table with the men, it being an established custom for them to dine by themselves. After dinner, they pass the rest of the day in dancing, singing ancient songs, and in games of dexterity, or of wit and fancy; and in the evening, at a convenient hour after supper, the three ritual healths having first gone round, the *knum* accompanies the bridegroom to the matrimonial apartment, which commonly is the cellar or the stable, whither the bride is also conducted by the *diveri* and the *stacheo*; but the three last are obliged to retire, and the *knum* remains alone with the new-married couple. If there happens to be any bed prepared better than straw, he leads them to it; and having untied the bride's girdle, he causes them both to undress each other reciprocally. It is not long since the *knum* was obliged to undress the bride entirely; but that custom is now out of use; and, instead of it, he has the privilege of kissing her as often as he pleases, wherever he meets her; which privilege may possibly be agreeable for the first months, but must soon become very disgusting. When they are both undressed, the *knum* retires, and stands listening at the door, if there be a door. It is his business to announce the consummation of the marriage, which he does by discharging a pistol, and is answered by many of the company. The next day the bride, without her veil and virginal cap, dines at table with the *svati*, and is forced to hear the coarse equivocal jests of her indecate and sometimes intoxicated company.

These nuptial-feasts, called *sdrave* by the ancient Huns, are by our Morlacchi called *sdravize*, from

whence our Italian word *sdravizzo* is undoubtedly derived. They continue three, six, eight, or more days, according to the ability or prodigal disposition of the family where they are held. The new-married wife gets no inconsiderable profit in these days of joy; and it usually amounts to much more than all the portion she brings with her, which often consists of nothing but her own cloaths and perhaps a cow; nay, it happens sometimes that the parents, instead of giving money with their daughter, get something from the bridegroom by way of price. The bride carries water every morning, to wash the hands of her guests as long as the feasting lasts; and each of them throws a small piece of money into the basin after performing that function, which is a very rare one among them, excepting on such occasions. The brides are also permitted to raise other little contributions among the *svati*, by hiding their shoes, caps, knives, or some other necessary part of their equipage, which they are obliged to ransom by a piece of money, according as the company rates it. And, besides all these voluntary or extorted contributions already mentioned, each guest must give some present to the new married wife at taking leave the last day of the *sdravize*; and then she also distributes some trifles in return, which commonly consist in shirts, caps, handkerchiefs, and such like.

The nuptial-rites are almost precisely the same thro' all the vast country inhabited by the Morlacchi; and those in use among the peasants and common people of the sea-coast of Dalmatia, Istria, and the islands, differ but little from them. Yet among these particular varieties, there is one of the island Zlarine, near Sebenico, remarkable enough; for there the *stari-svat* (who may naturally be supposed drunk at that hour) must, at one blow with his naked broad sword, strike the bride's crown of flowers off her head, when she is ready to go to bed. And in the island of Pago, in the village of Novoglia (probably the Gissa of ancient geographers), there is a custom more comical, and less dangerous, but equally savage and brutal. After the marriage-contract is settled, and the bridegroom comes to conduct his bride to church, her father or mother, in delivering her over to him, makes an exaggerated enumeration of her ill qualities: "Know, since thou wilt have her, that she is good for nothing, ill-natured, obstinate, &c." On which the bridegroom, affecting an angry look, turns to the young woman, with an "Ah! since it is so, I will teach you to behave better;" and at the same time regales her with a blow or a kick, or some piece of similar gallantry, which is by no means figurative. And it seems in general, that the Morlack women, and perhaps the greatest part of the Dalmatians, the inhabitants of the cities excepted, do not dislike a beating either from their husbands or lovers.

In the neighbourhood of Dernish, the women are obliged, during the first year after marriage, to kiss all their national acquaintances who come to the house; but after the first year they are dispensed from that compliment; and indeed they become so intolerably nasty, that they are no longer fit to practise it. Perhaps the mortifying manner in which they are treated by their husbands and relations is, at the same time,

both

Morlachia, both the cause and effect of their shameful neglect of their persons. When a Morlack husband mentions his wife, he always premises, by your leave, or begging your pardon. And when the husband has a bedstead, the wife must sleep on the floor near it. Our author often lodged in Morlack houses, and observed that the female sex is universally treated with contempt: it is true, that the women are by no means amiable in that country; they even deform and spoil the gifts of nature.

The pregnancy and births of those women would be thought very extraordinary among us, where the ladies suffer so much, notwithstanding all the care and circumspection used before and after labour. On the contrary, a Morlack woman neither changes her food nor interrupts her daily fatigue on account of her pregnancy; and is frequently delivered in the fields, or on the road, by herself; and takes the infant, washes it in the first water she finds, carries it home, and returns the day after to her usual labour, or to feed her flock.

The little creatures, thus carelessly treated in their tenderest moments, are afterwards wrapt in miserable rags, where they remain three or four months, under the same ungentle management; and when that term is elapsed, they are set at liberty, and left to crawl about the cottage and before the door, till they learn to walk upright by themselves; and at the same time acquire that singular degree of strength and health with which the Morlacchi are endowed, and are able, without the least inconvenience, to expose their naked breasts to the severest frosts and snow. The infants are allowed to suck their mother's milk while she has any, or till she is with child again; and if that should not happen for three, four, or six years, they continue all that time to receive nourishment from the breast. The prodigious length of the breasts of the Morlacchian women is somewhat extraordinary; for it is very certain, that they can give the teat to their children over their shoulders, or under their arms. They let the boys run about, without breeches, in a shirt that reaches only to the knee, till the age of 13 or 14, following the custom of Bossina, subject to the Porte, where no haraz or capitation-tax is paid for the boys till they wear breeches, they being considered before that time as children, not capable of labouring, or of earning their bread. On the occasion of births, and especially of the first, all the relations and friends send presents of eatables to the woman in childbed, or rather to the woman delivered; and the family makes a supper of all those presents together. The women do not enter the church till 40 days after child-birth.

The Morlacchi pass their youth in the woods, attending their flocks and herds; and in that life of quiet and leisure they often become dexterous in carving with a simple knife: they make woodencups, and whistles adorned with fanciful bass-reliefs, which are not void of merit, and at least show the genius of the people.

MORLEY (George), bishop of Winchester, was the son of Francis Morley, Esq; and was born at London in 1597. He was educated at Christ-church, Oxford, of which he had the canonry in 1641, and the next year was made doctor of divinity. He had also several church-preferments, of which he was de-

prived by the parliament visitors in the beginning of the year 1648. After this, king Charles I. sent for him to assist at the treaty of the Isle of Wight. After the king's death he attended the lord Capel at his execution, and then retired to Charles II. at the Hague, on whom he constantly waited till his majesty went to Scotland, when he retired to Atwerp, where he read the service of the church of England, as he afterwards did at Breda. At the Restoration he was first made dean of Christ church, and in 1660 was consecrated bishop of Worcester, and soon after was made dean of the royal chapel. In 1662 he was translated to the bishopric of Winchester, when he bestowed considerable sums on that see, in repairing Farnham-castle and his palace at Westminster, and in purchasing Winchester house at Chelsea. He died at Farnham-castle in 1684. He was a Calvinist, and before the wars was thought a friend to the Puritans; but after his promotion he took care to free himself from all suspicions of that kind. He was a pious and charitable man, of a very exemplary life, but extremely passionate. He published, 1. *Epistola apologetica et parennetica ad theologum quendam Belgam scripta*, in 4to. 2. The sum of a short conference between Father Darcey a Jesuit and Dr Morley at Brussels. 3. An argument drawn from the evidence and certainty of sense against the doctrine of Transubstantiation. 4. A letter to Anne duchess of York. 5. Several sermons, and other pieces.

MORNAY (Philippe de), seigneur du Plessis-Marly, was born at Buhy or Bishuy in Upper Normandy, November 5th, 1549; and educated at Paris. What was then thought a prodigy in a gentleman, he made a rapid progress in the belles lettres, in the learned languages, and in theology. He was at first destined for the church; but the principles of Calvinism, which he had imbibed from his mother, effectually excluded him from the ecclesiastical preferments to which he was entitled by his interest, abilities, and birth. After the horrible massacre of St Bartholomew, Philippe de Mornay made the tour of Italy, Germany, England, and the Low Countries; and he was equally improved and delighted by his travels. Mornay afterwards joined the king of Navarre, at that time leader of the Protestant party, and so well known since by the name of Henry IV. This prince sent Mornay, who employed his whole abilities, both as a soldier and a writer, in defence of the Protestant cause, to conduct a negociation with Elisabeth queen of England; and left him wholly to his own discretion in the management of that business. He was successful in almost every negociation, because he conducted them like an able politician, and not with a spirit of intrigue. He tenderly loved Henry IV. and spoke to him on all occasions as to a friend. When he was wounded at Aumale, he wrote to him in these words: "Sire, you have long enough acted the part of Alexander, it is now time you should act that of Cæsar. It is our duty to die for your majesty, &c. It is glorious for you, Sire, and I dare venture to tell you it is your duty, to live for us." This faithful subject did every thing in his power to raise Henry to the throne. But when he deserted the Protestant faith, he reproached him in the bitterest manner, and retired.

Mornay. retired from court. Henry still loved him; and was extremely affected with an insult which he received in 1597 from one Saint-Phal, who beat him with a cudgel, and left him for dead. Mornay demanded justice from the king; who gave him the following answer, a proof as well of his spirit as of his goodness of heart. "Monsieur Duplessis, I am exceedingly offended at the insult you have received; and I sympathize with you both as your sovereign and your friend. In the former capacity, I shall do justice to you and to myself; and had I sustained only the character of your friend, there are few perhaps who would have drawn their sword or sacrificed their life more cheerfully in your cause. Be satisfied, then, that I will act the part of a king, a master, and a friend, &c." Mornay's knowledge, probity, and valour, made him the soul of the Protestant party, and procured him the contemptuous appellation of the *Pope of the Huguenots*. He defended their doctrines both by speech and writing. One of his books on the Iniquity of the Mass, having stirred up all the Catholic divines, he refused to make any reply to their censures and criticisms except in a public conference. This was accordingly appointed to be held A. D. 1600, at Fountainbleau, where the court then was. The two champions were, du Perron bishop of Evreux, and Mornay. After a great many arguments and replies on both sides, the victory was adjudged to du Perron. He had boasted that he would point out to the satisfaction of every one five hundred errors in his adversary's book, and he partly kept his word. The Calvinists did not fail to claim the victory on this occasion, and they still continue to do so. This conference, instead of putting an end to the differences, was productive of new quarrels among the controversialists, and of much profane wit among the libertines. A Huguenot minister, who was present at the conference, observed with great concern to a captain of the same party,—"The bishop of Evreux has already driven Mornay from several strong holds." "No matter (replied the soldier), provided he does not drive him from Saumur." This was an important place on the river Loire, of which Duplessis was governor. Hither he retired, his attention being constantly occupied in defending the Huguenots, and in making himself formidable to the Catholics. When Louis XIII. was making preparations against the Protestants, Duplessis wrote him a letter, dissuading him against such a measure. After employing the most plausible arguments, he concludes in the following manner: "To make war on the subject, is an indication of weakness in the government. Authority consists in the quiet submission of the people, and is established by the prudence and justice of the governor. Force of arms ought never to be employed except in repelling a foreign enemy. The late king would have sent the new ministers of state to learn the first elements of politics, who like unskillful surgeons would apply violent remedies to every disease, and advise a man to cut off an arm when his finger aches." These remonstrances produced no other effect than the loss of the government of Saumur, of which he was deprived by Louis XIII. in 1621. He died two years after, November 11th, 1623, aged 74, in his barony de la Forêt-sur-Seure in Poitou. The Prote-

stant cause never had an abler supporter or one who did it more credit by his virtues and abilities.

*Censeur des courtisans, mais à la cour aimé;
Fier ennemi de Rome, et de Rome estimé.* HENRIADE.

The following is a list of his works: 1. *Un Traité de l'Eucharistie*, 1604, in folio. 2. *Un Traité de la vérité de la Religion Chrétienne*, 8vo. 3. A book entitled *La Mystère d'iniquité*, 4to. 4. *Un discours sur le droit prétendu par ceux de la maison de Guise*, 8vo. 5. Curious and interesting *Memoirs* from the year 1572 to 1629, 4 vols 4to, valuable. 6. *Letters*; which are written with great spirit and good sense. David des Liques has given us his life in quarto; a book more interesting for the matter than the manner.

MORNE-GAROU, a very remarkable volcanic mountain on the island of St Vincent's in the West Indies. It was visited by Mr James Anderson surgeon in the year 1784, who is the only person that ever ascended to the top of it, and from whose account, in the *Philosophical Transactions*, Vol. LXXV. the following is taken.

The mountain in question is situated on the north-west part of the island, and is the highest in it. It is constantly reported to have emitted volcanic eruptions; and the ravins at the bottom seem to corroborate the traditions of the inhabitants in this respect. The structure of it, when viewed at a distance, appears different from that of any other mountain in the island, or that Mr Anderson had seen in the West Indies. He could perceive it divided into many different ridges, separated by deep chasms, and its summit appeared quite destitute of every vegetable production. Several ravins, that run from the bottom a great way up the mountain, were found quite destitute of water, and pieces of pumice-stone, charcoal, and several earths and minerals of a particular quality, found in them, plainly indicated some very great singularity in this mountain. Some very old men also informed our author, that they had heard it related by the captain of a ship, that between this island and St Lucia he saw flames and smoke rising from the top of the mountain, and next morning his decks were covered with ashes and small stones.

Mr Anderson's curiosity was so much excited by these circumstances, that he formed a resolution of going up to the top; but was informed that this was impossible, nor could he find either white man, Caribbee, or negro, who would undertake to show him the way. Having observed the basis as well as he could, with a view to discover the most proper place for attempting an ascent, he found several dry ravins that seemingly ran a great way up, though he could not be certain that they were not intersected by rocks or precipices lying across. Having examined the mountain with a good glass, he thought he perceived two ridges by which there was a possibility of getting up; and though they appeared to be covered for a great way with wood, he hoped by a little cutting to open a way through it.

On the 26th of February 1784 our author began his journey, having been furnished by a Mr Maloune, who lives within a mile of the foot of the mountain, with two stout negroes, and having another boy who waited on himself. They arrived at the bottom of the

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the mountain a little before seven in the morning, having each a good cutlass to cut through the woods, or to defend themselves in case of an attack from the Caribbees or runaway negroes. Before they could get at either of the ridges, however, they had a rock to climb upwards of 40 feet high. Having scrambled up this with great difficulty, they found themselves in the bottom of a deep and narrow ravin, which having ascended a little way, they arrived at the habitation of Mr Gasco a Frenchman. Mr Anderson expresses his surprise, that a young and healthy man, and a good mechanic, should sequestrate himself from the world among woods and precipices, where he was besides in continual danger of being swept away with his whole habitation by the torrents occasioned by the rains. He found him, however, an intelligent man, and was hospitably entertained by him.

"The difficulty (says Mr Anderson) in going thro' woods in the West Indies, where there are no roads or paths, is far beyond any thing an European can conceive. Besides tall trees and thick underwood, there are hundreds of different climbing plants twisted together like ropes, and running together in all directions to a great extent, and even to the tops of the highest trees. They cannot be broken by pushing on; and many of them are not to be cut without difficulty. Besides these, a species of grass, the *Schænus lithospermus*, with serrated leaves, cuts and tears the hands and face terribly."

By reason of these obstructions, it was upwards of two hours before they got upon the ridge; but here they found their passage more difficult than before. They were now surrounded by a thick forest, rendered more impracticable by the large piles of trees blown down by the hurricanes; which obliged them in many places to creep on their hands and feet to get below them, while in others it was necessary to climb to a considerable height to get over them; at the same time that by the trunks being frequently rotten, they often tumbled headlong from a great height, and could not extricate themselves without great difficulty.

The fatigue of cutting their way through the woods soon became intolerable to the negroes; so that about four in the afternoon he could not prevail on them to go any farther. Mr Anderson therefore perceiving it was impossible to get to the summit that night, and his water being totally expended, returned to Mr Gasco's, where he spent the night, determining to try another route next morning. The hospitable Frenchman entertained him in the best manner he could; but though he parted with his own hammock to him, and slept on a board himself, Mr Anderson found it impossible to shut his eyes the whole night by reason of the cold. "His hut (says he) was built of *roseaux* or large reeds, between each two of which a dog might creep through, and the top was covered with dry grass. It is situated in the bottom of a deep gully, where the sun does not shine till nine in the morning nor after four in the afternoon. It is surrounded by thick wood; and during the night the whole of the mountain is covered with thick clouds, from which it frequently rains, and which makes the night air exceedingly cold."

Early next morning Mr Anderson set out in company with the negro boy, who continued very faithful

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to him during the whole of the journey. He now determined to take his course up the ravin, and proceeded for about a mile and an half without any considerable obstruction. It now, however, began to narrow fast: there were numbers of rocks and precipices to climb over, with many bushes and vines which could scarcely be got through. At last the ravin terminated at the bottom of a very high precipice. It was impossible to know the extent of this, as the top was covered with thick wood; but from the bottom upward, as far as he could see, was loose sand with ferns and tufts of grass, which as soon as he took hold of them came up by the roots. Though the ascent was plainly at the risk of his life, Mr Anderson resolved to attempt it; and therefore telling the boy to keep at some distance behind, lest he should tumble and drive him down, he began to ascend, digging holes with his cutlass to put his feet in, and taking hold of the tufts of grass as lightly as possible. Notwithstanding all his care, however, he frequently slipped down a considerable way; but as it was only loose sand, he could easily push his cutlass into it up to the handle, and thus by taking hold of it recover himself again. At last he got up to some wild plantains, which continued all the way to the place where the trees began to grow. Here he rested for some time, waiting for the boy, who got up with much less difficulty than he had done. On getting up to the top of the precipice, he found himself on a very narrow ridge, covered with wood, and bounded by two ravins, the bottoms of which he could not see, the descent to them appearing to be nearly perpendicular, though all the way covered with thick wood. Proceeding onwards, they found the ridge exceedingly narrow, in many places not six feet broad; with a tremendous gulf on each side, into which they were every moment in danger of falling; so that Mr Anderson was obliged to lie down on his belly with great caution, in order to see through the bushes how the ridge tended.

Here a sulphureous smell, or rather one like gunpowder, began to be perceived; which, Mr Anderson knew, must proceed from the top of the mountain, as the wind then blew that way; and as it plainly grew stronger as he advanced, he was in hopes that the top could not be very far distant. Perceiving a rising before him, he imagined, that, by getting upon it, he might have a view of the top of the mountain; but when this was done, he could only see a peak on the north-west side of the mountain, to which, by appearance, he judged himself very little nearer than when at the bottom.

The woods now became very difficult, great quantities of fallen trees lying buried among the grass; and being rotten, he was frequently buried very deep among them when he thought himself walking upon firm ground. About noon he was alarmed with a rustling among the bushes, and something like a human voice behind him; but as he was preparing to defend himself against Caribbees or run-away negroes, he was agreeably surprised with the sight of those who had formerly left him, with three others, sent by Mr Maloune with plenty of provisions. Encouraged by this assistance, after refreshing themselves, they renewed their labours with fresh vigour, and Mr Anderson thought himself sure of reaching the top before night.

In

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garou.

In a little time he had a fair view of the ravin on the left, which was of prodigious depth, and ran from near the top of the mountain to the sea. Its bottom seemed to be a rock nearly resembling lava in colour, and it seemed as if there had been vast torrents of sulphureous matter running upon it for some time.—He now regretted much that he knew not of this ravin before he commenced his excursion, as, by passing a headland in a canoe, and getting into it, he might have gained the summit without all those delays and difficulties he had encountered.

About four in the afternoon he had no prospect of the top of the mountain, but imagined that if he could get into the ravine before night, he might easily reach it next morning. After cutting through wild plantains for a great way, however, he found himself at sunset on the brink of a precipice, over which he prevented himself from falling by catching hold of some shrubs. They were now about half way down, but all the rest of the way seemed a perpendicular precipice, which it was impossible to pass; the top of the mountain was yet a great way off, and there was no other resource than to attempt the ridge they had left. The evening was now so far advanced, that they were obliged to take up their residence where they were; and there was only time to place two or three sticks against the stump of a tree, and slightly to cover them with plantain leaves for a night's habitation.—Their situation, however, was extremely uncomfortable: it began to rain and blow violently, which prevented them from getting a fire made, so that they were almost chilled with cold. As soon as they could see, they renewed their work with great alacrity, and in a short time had the satisfaction to perceive that the woods became thin. About eleven o'clock they obtained a full view of the top, about a mile distant. It seemed to be composed of six or seven ridges, very much broken in the sides, as if they had suffered great convulsions; and they were divided by excessively deep ravines without any water in them. Mr Anderson directed his course towards a high peak that overlooked a large excavation where the ridges met, and which he supposed to be the crater of the volcano. In his way, he found the last wood composed of a most beautiful species of trees. After that he entered into a thick long grass intermixed with fern, which branched and ran in every direction. Thro' this they were obliged to cut their way with almost as much difficulty as they had done through the woods, and it seemed to continue very near to the top of the mountain. The fatigue of this work soon reduced them to such a situation, that they were scarce able to stand; and they were obliged to quench their thirst, which was excessive, by chewing the leaves of the begonia obliqua, there being no water to be had in the place. Two of the negroes returned, and the rest refused to proceed any farther; so that Mr Anderson himself was obliged to abandon the enterprise, and they all began to descend about half an hour after twelve; and as there was now a clear path all the way down, they arrived at Mr Gasco's by sunset; and notwithstanding his extreme weariness, Mr Anderson continued his journey to Mr Maloune's, where he arrived between six and seven at night.

Our traveller having refreshed himself to the 4th of
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garou.

March, in order to sustain the fatigues of his journey the better, set out about four that morning in company with a Mr Fraser, who had resolved to accompany him. They met with little difficulty till they came to the place whence they had formerly returned. Here, however, they were obliged for a quarter of a mile to cut their way through the grass and ferns already mentioned; which being done, they met with no further obstruction. When they came within a quarter of a mile of the top, they found the climate suddenly altered, the air very cold, and the vegetable productions changed, the whole summit of the mountain being barren. On the confines of the grassy and barren regions, however, he found some beautiful plants; and he observes, that this is the only place in the West Indies where he ever found moss: but here it grows in such plenty, that he frequently sunk in it up to the knees. About noon they reached the summit, and were instantly surprised with the sight of a most extraordinary cavity. It is situated in the very centre of the mountain, at the place where all the ridges meet. Its diameter is something more than a mile, and its circumference to appearance a perfect circle. Its depth from the surrounding margin is above a quarter of a mile, and it narrows a little, but very regularly, to the bottom. Its sides are very smooth, and for the most part covered with short moss, except towards the south, where there are a number of small holes and rents. This is the only place where it is possible to go down to the bottom; and the descent is very dangerous on account of the numberless small chasms. On the west side is a section of a red rock like granite, cut very smooth, and having the same declivity with the other parts. All the rest of the surrounding sides seem to be composed of sand, which has undergone the action of an intense fire. It has a crust quite smooth, and about an inch thick, almost as hard as rock; on breaking thro' which we meet with nothing but loose sand. In the centre stands a burning mountain about a mile in circumference, of a conic form, "but quite level." Out of the middle of the summit rises a small eminence eight or ten feet high, and perfectly conical; from the apex of which a column of smoke constantly issues. It is composed of large masses of red granite-like rock, of various shapes and sizes, which appear to have been split into their present form by some terrible convulsion of nature; and are piled up very regular. Great quantities of smoke issue from most parts of the mountain, especially on the north side, which appears to be burning from top to bottom; and the heat is so intense, that it is impossible to ascend it. It is even very dangerous to go round the base, as large masses of rock are constantly splitting with the heat and tumbling down. At the bottom, on the north side, is a very large rock split in two. Each of these halves, which are rent in all directions, are separated to a considerable distance from each other, and the crevices have glossy efflorescences tasting like vitriol. There are also beautiful crystallizations of sulphur; and on all parts of the mountain are great quantities of sulphur, also alum, vitriol, &c.

From the external appearance of this mountain, Mr Anderson conjectures that it had but lately begun to burn; as on several parts of it he saw small shrubs

Moroc. and grass, which looked as if they had been but lately scorched and burnt. There were also several holes on the south from which smoke issued, that appeared to have broken out but lately, the adjacent bushes being but lately burnt. On two opposite sides, the east and west, of the burning mountain, are two lakes of water, about a stone's throw in breadth. They appear to be deep in the middle, and have a bottom of a kind of clay. The water is a chalybeate, and has a pleasant taste. These lakes probably derive their existence in a great measure, if not totally, from the rain-water running down the sides of the crater. On the north side Mr Anderson observed the traces of great torrents, that to appearance had conveyed vast quantities of water to these lakes; and by the stones at the bottom he could perceive that absorption or evaporation, or both, went on very fast. The greater part of the bottom of the crater is very level; and on the south side are some shrubs and small trees. Some pieces of pumice-stone were met with, and many stones about the size of a man's fist, rough, and blue upon one side, are scattered all over the mountain.

The motion of the clouds on the top of this mountain was very singular. Though there were several parts higher than the crater, yet the clouds seemed always to be attracted by the latter. After entering on its east or windward side, they sunk a considerable way into it; then mounting the opposite side, and whirling round the north-west side, they ran along a ridge which tended nearly north-east, and afterwards sunk into a deep ravin dividing this ridge from another on the north-west corner of the mountain, and the highest on it, lying in a direction nearly north and south. They keep in this ridge to the south end, and then whirl off in their natural direction.

From the situation of these islands to one another, and to the continent of South America, Mr Anderson conjectures, that there are submarine communications between the volcanoes in each of them, and from them to those in the high mountains of South America. He observes, that the crater in this island lies nearly in a line with Soufriere in St Lucia and Morne Pelee in Martinico; and probably from thence to a place of the same kind in Dominique, and from thence to the other islands; there being something of the kind in each, Barbadoes and Tobago excepted.

MOROC, or MAROC, a beautiful bird of Abyssinia described by Mr Bruce, who thinks its name is derived from *mar* "honey," though he says that he never heard it was further concerned in the honey than destroying bees. It seems to pursue those insects out of enmity or diversion as well as for food, leaving great numbers dead on the ground, besides those which it devours for food. In consequence of this property, the maroc is never found any where but in those parts where the honey is very plentiful, tho' the Abyssinians never take any notice of the ravages they commit among their stocks of bees.

The moroc resembles the cuckoo in size and shape, but differs in other respects. Its mouth is very wide, the opening reaching almost to his eyes; the inside of the mouth and throat yellow, the tongue sharp-pointed, and capable of being drawn almost half its length out of the mouth beyond the point of its beak, and is very flexible. The head and neck are brown, with-

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out any mixture of other colours: there are likewise a number of very small and scarcely visible hairs at the root of the beak. The eyebrows are black; the beak pointed, and very little crooked; the pupil of the eye black, and surrounded with an iris of a dull and dusky red: The fore-part of the neck is light yellow, darker on each side than in the middle, where it is partly white: the yellow on each side reaches near the shoulder, or round part of the wing; and from this the whole breast and belly is of a dirty white to the under part of the tail; and from this the feathers begin to be tipped with white, as are all those that cover the outside of the wing. The wing has eight feathers of the largest size and six of the second: the tail consists of twelve feathers, the longest three being in the middle: they are placed closely together; and the tail is of an equal breadth from top to bottom, the feathers being also tipped with white. The thighs are covered with feathers of the same colour as those of the belly, reaching more than half way down the legs, which are black, as well as the feet, and marked distinctly with scales. There are two toes before and behind, each of which has a sharp and crooked claw. It makes a sharp snapping noise when it catches the bees, evidently from closing its beak; but Mr Bruce never could discover that it had any song.

This seems to be the creature mentioned by Dr Sparman under the name of *cuculus indicator*, which (he says) has the singular property of discovering the nests of wild bees, and leading travellers by a certain cry to the place where the treasure is deposited. According to Sparman's account, it makes known these discoveries by the same cry to foxes as well as to the human species; but Jerome Lobo, who mentions the Abyssinian bird, does not take notice of the foxes, though he mentions its singing melodiously when it arrives at the place where the honey is deposited. Both these accounts are severely criticised by Mr Bruce. "I cannot (says he), for my own part, conceive, in a country where there are so many thousand hives, that there was any use for giving to a bird a peculiar instinct or faculty of discovering honey, when, at the same time, nature had deprived him of the power of availing himself of any advantage from the discovery; for man seems in this case to be made for the service of the moroc, which is very different from the common and ordinary course of things; man certainly needs him not, for on every tree, and on every hillock, he may see plenty of honey at his own deliberate disposal. I cannot then but think, with all submission to these natural philosophers, that the whole of this is an improbable fiction; nor did I ever hear a single person in Abyssinia suggest, that either this or any other bird had such a property. Sparman says it was not known to any inhabitant of the Cape, any more than that of the moroc was in Abyssinia; it was a secret of nature, hid from all but these two great men; and I most willingly leave it among the catalogue of their particular discoveries."

MORNING, the beginning of the day, or the time of the sun-rising. The astronomers reckon morning, *mane*, from the time of midnight to that of mid-day. Thus an eclipse is said to begin at 11 o'clock in the morning, &c.

MORNING star, is the planet Venus, when a little

U u to

MOROC.
Morning.

Morocco. to the westward of the sun ; that is, when she rises a little before. In this situation she is called by the Greeks *Phosphorus* ; by the Latins *Lucifer*, &c.

1
Situation
and bound-
aries.

MOROCCO, an empire of Africa, comprehending a considerable part of the ancient Mauritania, is bounded on the west by the Atlantic Ocean ; on the east by the river Mulvya, which separates it from Algiers ; on the north by the Mediterranean ; and on the south by mount Atlas, or rather by the river Sus, which divides it from the kingdom of Tafilet. Its greatest length is from the north-east to the south-west, amounting to above 590 miles ; its breadth is not above 260 where broadest, and in the most narrow places is not above half that breadth.

2
History.

The ancient history of Morocco has been already given under the article **MAURITANIA**. It continued under the dominion of the Romans upwards of 400 years. On the decline of that empire it fell under the Goths, who held it till about the year 600, when the Goths were driven out by the Vandals, the Vandals by the Greeks, and they in their turn by the Saracens, who conquered not only this empire, but we may say the whole continent of Africa ; at least their religion, one way or other, is to be found in all parts of it. The Saracen empire did not continue long united under one head, and many princes set up for themselves in Africa as well as elsewhere, through whose dissensions the Almoravides were at length raised to the sovereignty, as related under the article **ALGIERS**, n° 2. Yusef, or Joseph, the second monarch of that line, built the city of Morocco, conquered the kingdom of Fez, and the Moorish dominions in Spain ; all which were lost by his grandson Abbu Hali, who was defeated and killed by the Spaniards. On this prince's death the crown passed to the Mohedians, or Almohedes, with whom it had not continued above three generations, when Mohammed the son of Al Mansur lost the famous battle of Sierra Morena, in which 200,000 Moors were slain, and in consequence of which Alphonso X. retook a great many of the Moorish conquests immediately after.

Mohammed died soon after this disgrace, and left several sons, between whom a civil war ensued, during which the viceroys of Fez, Tunis, and Tremesen, found means to establish themselves as independent princes. At length one of the princes of the royal blood of Tremesen having defeated the Almohedes, made himself master of the kingdoms of Morocco and Fez, and entailed them on his own family. In a short time, however, this family was expelled by the Merini, the Merini by the Oatazes, and these by the Sharifs of Hascen, who have kept the government ever since.

This happened about the year 1516 ; and since that time, what we have under the name of history is little else than a catalogue of the enormous vices and excesses of the emperors. They have been in general a set of bloody tyrants ; though they have had among them some able princes, particularly Muley Molue, who defeated and killed Don Sebastian king of Portugal. See the article **PORTUGAL**, n° 26. They have lived in almost a continual state of warfare with the kings of Spain and other Christian princes ever since ; nor does the crown of Great Britain sometimes disdain, as in the year 1769, to purchase their friendship with presents.

Nothing can be conceived more unjust and despotic than the government of Morocco, and nothing more degenerate than the character of the people. The emperor is allowed to have not only an uncontrollable power over the lives and fortunes of his subjects, but in a great measure over their consciences, such as they are ; in as much as he is the only person who, as the successor of the prophet, has a right to interpret the Koran ; and appoints all the judges under him, of whom those of Morocco and Fez are the chief, whose business it is to explain and dispense all matters relating to their religion ; and who, being his creatures and dependents, dare not steer otherwise than as he directs. Whenever therefore the laws are enacted by him, and proclaimed by his governors in all the provinces, as is commonly done, that none may plead ignorance, they are everywhere received with an implicit and religious submission. On the other hand, the subjects are bred up with a notion, that those who die in the execution of his command are entitled to an immediate admittance into paradise, and those who have the honour to die by his hand to a still greater degree of happiness in it. After this we need not wonder at finding so much cruelty, oppression, and tyranny on the one side, and so much submission, passiveness, and misery on the other.

This latter, however, extends no farther than the Moors : for as to the mountaineers, the subjection and tribute they pay to those tyrants was always involuntary, and altogether forced ; and as for the negroes, their zeal and attachment is owing merely to the great sway and power which they have gained in the government, on various accounts. They were first introduced, or rather their importation increased, by the policy of Muley Ishmael, a late emperor, at a period when there was a great decrease of population in the empire, occasioned in some degree by the enormous cruelties exercised by its former sovereigns, who have been known not unfrequently, through a slight disgust, to abandon a whole town or province to the sword. In the character of Muley Ishmael were found the most singular inconsistencies ; for it is certain, that although a tyrant of the same class, yet in other respects, as if to repair the mischief which he committed, he left nothing undone for the encouragement of population.—He introduced, as above-mentioned, large colonies of negroes from Guinea ; built towns for them, many of which are still remaining ; assigned them portions of land, and encouraged their increase by every possible means. He soon initiated them in the Mahometan faith ; and had his plan been followed, the country by this time would have been populous, and probably flourishing. As the negroes are of a more lively, active, and enterprising disposition than the Moors, they might soon have been taught the arts of agriculture ; and their singular ingenuity might have been directed to other useful purposes. It is true, Muley Ishmael, when he adopted this plan, had more objects in view than that of merely peopling his dominions. He saw plainly that his own subjects were of too capricious a disposition to form soldiers calculated for his tyrannical purposes. They had uniformly manifested an inclination to change their sovereigns, though more from the love of variety than to reform the government, or restrain the abuses of tyranny. In short, whatever revolutions

Morocco.
3
Govern-
ment.

4
Account of
the black
troops.

Morocco.

revolutions took place in the country, consisted merely in a change of one tyrant for another. Muley Ishmael had discernment enough to see, therefore, that by forming an army of slaves, whose sole dependence should rest upon their master, he could easily train them in such a manner as to act in the strictest conformity to his wishes. He soon learnt that the great object with the negroes was plenty of money and liberty of plunder; in these he liberally indulged them, and the plan fully answered his expectations. Though, however, Muley Ishmael had no great merit in introducing subjects for the purposes of tyranny, yet the good effects of this new colonization were very generally experienced. By intermarrying among themselves, and intermixing among the Moors (for the Moors will keep negro women as concubines, though they seldom marry them), a new race of people started up, who became as useful subjects as the native inhabitants, and brought the empire into a much more flourishing state than it had ever been in since their great revolution.

Sidi Mahomet, his grandson and successor, had different views, and was actuated by different motives. From his inordinate avarice, he ceased to act towards his black troops in the generous manner which had distinguished his predecessor Muley Ishmael; and they soon showed themselves discontented with his conduct. They frequently threatened to revolt, and support those of his sons who were in opposition, and who promised them the most liberal rewards. They offered to place his eldest son Muley Ali, who is since dead, on the throne; but this prince, not unmindful of the duty which he owed his father and sovereign, declined their offer. They next applied to Muley Yazid, the late emperor, who at first accepted of the assistance they tendered, but in a short time relinquished the plan. Sidi Mahomet, disgusted with this conduct of the negroes, determined to curb their growing power, by disbanding a considerable part of these troops, and banishing them to distant parts of the empire. This important mode of population has therefore been of late years neglected, while no better system has been substituted in its room; for though the late emperor indulged in cruelty much less frequently than his predecessors, yet population has, perhaps, been more completely impeded by the general poverty which he has introduced into the country by his severe exactions, than if he had made a liberal use of the sword or of the bow-string.

5
Despotism
of the em-
perors.

A most flagrant species of despotism, which renders the emperors still more formidable to their subjects, is their making themselves their sole heirs, and, in virtue of that, seizing upon all their effects, and making only such provision for their families as they think proper; and often, on some frivolous pretence, leaving them destitute of any, according to the liking or dislike they bear to the deceased; so that, upon the whole, they are the only makers, judges, and interpreters, and in many instances likewise the executioners, of their own laws, which have no other limits than their own arbitrary will. To preserve, however, some show or shadow of justice, they allow their musti a kind of superiority in spirituals, and a sort of liberty to the meanest subject to summon them before his tribunal. But the danger which such an attempt would bring upon a plaintiff, perhaps no less than

death and destruction, is of itself sufficient to deter any man from it; especially considering the little probability there is that the judges of it would run the risk of declaring themselves against a monarch whose creatures they are, and on whom their lives and fortunes so absolutely depend. The titles which the emperors of Morocco assume, are those of *Most glorious, mighty, and noble emperor of Afric, king of Fez and Morocco, Taphilet, Suz, Darba, and all the Algarbe, and its territories in Afric; grand Sharif* (or, as others write it, *Xarif*, that is, "successor, or vicegerent,") of the great prophet Mohammed, &c.

The judges or magistrates that act immediately under the emperor are either spiritual or temporal, or rather ecclesiastical and military. The musti and the kadis are judges of all religious and civil affairs; and the bashaws, governors, alcaides, and other military officers, of those that concern the state or the army: all of them the most obsequious creatures and slaves of their prince, and no less the rapacious tyrants of his subjects, and from whom neither justice nor favour can be obtained but by mere dint of money and extortionate bribery, from the highest to the lowest. Neither can it indeed be otherwise in such an arbitrary government, where the highest posts must not only be bought of the prince at a most extravagant price, and kept only by as exorbitant a tribute, which is yearly paid to him, but where no one is sure to continue longer than he can bribe some of the courtiers to insinuate to the monarch that he pays to the utmost of his power, and much beyond what was expected from him. Add to this, that those bashaws, governors, &c. are obliged to keep their agents and spies in constant pay at court, to prevent their being supplanted by higher bidders, slanderers, or other underminers. In short, power and weakness, rank and meanness, opulence and indigence, are here equally dependent, equally uncertain. There are instances of the sultan elevating at once a common soldier to the rank of a bashaw, or making him a confidential friend; the following day he would perhaps imprison him, or reduce him again to the station of a private soldier. It is surprising that men under these circumstances should be ambitious of rank, or desirous of riches and power. Yet such is the disposition of these people, that they have an unbounded thirst for rank and power with all their uncertainties; and what is more extraordinary, when they have obtained a high station, they seldom fail to afford their sovereign a plea for ill treating them, by abusing in some way or other their trust.

From what has been said, it may be reasonably concluded that the revenue arising to the emperor from the last mentioned source, that of bribery, extortion, and confiscation, must be very considerable, though there is no possibility to make any other conjecture of its real amount than that it must be an immense one. Another considerable branch is the piratical trade, which brings the greater income into his treasury, as he is not at any expence either for fitting of corsair vessels out, or maintaining their men; and yet has the tenth of all the cargo and of all the captives; besides which, he appropriates to himself all the rest of them, by paying the captors 50 crowns per head, by which means he engrosses all the slaves to his own service and advantage. This article is indeed a

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Morocco.

6
Admini-
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justice.

7

Royal reve-
nue.

Morocco. very considerable addition to his revenue, not only as he sells their ransom at a very high rate, but likewise as he has the profit of all their labour, without allowing them any other maintenance than a little bread and oil, or any other assistance when sick than what medicines a Spanish convent, which he tolerates there, gives them gratis; and which, nevertheless, is forced to pay him an annual present for that toleration, besides furnishing the court with medicines, and the slaves with lodging and diet when they are not able to work. Another branch of his revenue consists in the tenth part of all cattle, corn, fruits, honey, wax, hides, rice, and other products of the earth, which is exacted of the Arabs and Brebes, as well as of the natives; and these are levied, or rather farmed, by the bashaws, governors, alcaides, &c. with all possible severity. The Jews and Christians likewise pay an income or capitation, the former of six crowns *per head* on all males from 15 years and upwards, besides other arbitrary imposts, fines, &c. That on the Christians, for the liberty of trading in his dominions, rises and falls according to their number, and the commerce they drive; but which, whatever it may bring yearly into his coffers, is yet detrimental to trade in general, seeing it discourages great numbers from settling there, notwithstanding the artful invitations which the emperors and their ministers make use of to invite them to it; for, besides those arbitrary exactions, there is still another great hardship attending them, viz. that they cannot leave the country without forfeiting all their debts and effects to the crown. The duties on all imports and exports is another branch of his income, the amount of which, *communibus annis*, no author has yet given us any account of; only consul Hatfield has computed the whole yearly revenue, including ordinaries and extraordinaries, to amount to 500 quintals of silver, each quintal, or 100 lb. weight, valued at somewhat above 330 l. Sterling: so that the whole amounts to no more, according to him, than 165,000 l.; a small revenue indeed for so large an empire, if the calculation may be depended upon. But St Olan, though he does not pretend so much as to guess at the yearly amount of it, in general represents it as so considerable, that Muley Ishmael was reckoned to have amassed out of it a treasure in gold and silver of about 50 effective millions; but whether of crowns or livres he does not tell us, nor how he came by his knowledge of it; because that politic prince, even by his own confession, not only caused all his riches to be buried in sundry places under-ground, his gold and silver to be melted into great lumps, and laid in the same privacy under-ground, but likewise all those whom he entrusted with the secret to be as privately murdered.

⁸
Climate of
Morocco.

The climate of the empire of Morocco is in general sufficiently temperate, healthy, and not so hot as its situation might lead us to suppose. The chain of mountains which form Atlas, on the eastern side, defends it from the east winds, that would scorch up the earth were they frequent. The summit of these mountains is always covered with snow; and their abundant descending streams spread verdure through the neighbourhood, make the winter more cold, and temper the heats of summer. The sea on the west side, which extends along the coast from north to south, also re-

Morocco. freshes the land with regular breezes, that seldom vary according to their seasons. At a distance from the sea, within land, the heat is so great, that the rivulets become dry in summer; but as in hot countries dews are plentiful, the nights are there always cool. The rains are tolerably regular in winter; and are even abundant, though the atmosphere is not loaded with clouds as in northern latitudes. Those rains which fall by intervals are favourable to the earth, and increase its fecundity. In January the country is covered with verdure, and enamelled with flowers. Barley is cut in March, but the wheat harvest is in June. All fruits are early in this climate; and in forward years the vintage is over in the beginning of September. Though in general there is more uniformity and less variation in hot than in northern climates, the first are nevertheless exposed to the intemperance of weather: too heavy rains often impede the harvest; and drought has still greater inconveniences, for it ensures the propagation of locusts. These fatal insects, which have so often laid desolate hot countries, sometimes commit the most dreadful ravages in the empire of Morocco. They come from the south, spread themselves over the lands, and increase to infinity when the rains of spring are not sufficiently heavy to destroy the eggs they deposit on the earth. The large locusts, which are near three inches long, are not the most destructive: as they fly, they yield to the current of wind, which hurries them into the sea, or into sandy deserts, where they perish with hunger or fatigue. The young locusts, that cannot fly, are the most ruinous; they creep over the country in such multitudes, that they leave not a blade of grass behind; and the noise of their feeding announces their approach at some distance. The devastations of locusts increase the price of provisions, and often occasion famines: but the Moors find a kind of compensation in making food of these insects; prodigious quantities of which are brought to market salted and dried like red herrings. They have an oily and rancid taste, which habit only can render agreeable; they are eat here, however, with pleasure. The winters in Morocco are not severe, nor is there an absolute need of fire. In the coldest weather the thermometer seldom sinks to more than five degrees above the freezing point. The longest days in Morocco are not more than 14 hours, and the shortest consequently not less than ten.

The soil of Morocco is exceedingly fertile. It is ⁹soil, and most so in the inland provinces. On the western coast it is in general light and stony, and is better adapted to the vine and olive than the culture of wheat. They annually burn, before the September rains, the stubble, which is left rather long; and this and the dung of cattle, every day turned to pasture, form the sole manure the land receives. The soil requires but little labour, and the ploughing is so light that the furrows are scarcely six inches deep; for which reason, in some provinces, wooden ploughshares are used for cheapness.

The empire of Morocco might supply itself with all necessaries, as well from the abundance and nature of its products, as from the few natural or artificial wants of the Moors occasioned by climate or education. Its wealth consists in the fruitfulness of its soil: its corn, fruits, flocks, flax, salt, gums, and wax, would not only supply its necessities, but yield a superflux, which might become

Morocco.
to
Produc-
tions.

become an object of immense trade and barter with other nations. Such numerous exports might return an inexhaustible treasure, were its government fixed and secure, and did subjects enjoy the fruits of their labour and their property in safety. The increase of corn in Morocco is often as sixty to one, and thirty is held to be but an indifferent harvest. The exportation of this corn is burdened by the laws, and by the prejudices of an intolerant religion, which permits them not to sell their superabundance to infidels. The property of land is besides entirely precarious; so that each individual grows little more than sufficient for his own wants. Hence it happens, when the harvest fails from the ravages of locusts or the intemperance of seasons, these people are exposed to misery, such as Europeans have no conception of, who enjoy a stable administration, which obviates and provides for all their wants.

The Moors, naturally indolent, take little care of the culture of their fruits. Oranges, lemons, and thick-skinned fruits, the trees of which require little nurture, grow in the open fields; and there are very large plantations of them found, which they take the trouble to water in order to increase their product. Their vines, which yield excellent grapes, are planted as far as the 33d degree, as in the southern provinces of France, and are equally vigorous. But at Morocco, where they yield a large and delicious grape, they are supported by vine-poles five and six feet above ground; and as they are obliged to be watered, the little wine made there is seldom preserved. Figs are very good in some parts of the empire, but toward the south they are scarcely ripe before they are full of worms; the heats and night dews may, perhaps, contribute to this speedy decay. Melons, for the same reason, are rarely eatable; they have but a moment of maturity; which passes so rapidly that it is with difficulty seized. Water-melons are every where reared, and in some provinces are excellent. Apricots, apples, and pears, are in tolerable plenty in the neighbourhood of Fez and Mequinez, where water is less scarce and the climate more temperate. But in the plain, which extends along the western coast, these delicate fruits are very indifferent, have less juice or taste, and the peaches there do not ripen. The tree called the prickly pear, or the Barbary fig, is plentifully found in the empire of Morocco; and is planted round vineyards and gardens, because its thick and thorny leaves, which are wonderfully prolific, form impenetrable hedges. From these leaves a fruit is produced, covered with a thorny skin, that must be taken off with care. This fruit is mild, and full of very hard, small, kernels. The olive is every where found along the coast, but particularly to the south. The trees are planted in rows, which form alleys, the more agreeable, because the trees are large, round, and high in proportion. They take care to water them, the better to preserve the fruit. Oil of olives might here be plentifully extracted, were taxation fixed and moderate; but such has been the variation it has undergone, that the culture of olives is so neglected as scarcely to produce oil sufficient for internal consumption. In 1768 and 1769 there were near 40,000 quintals of oil exported from Mogadore and Santa-Cruz to Marseilles, and ten years after it cost 15 d. per pound. Thus do

the vices of government expose nations to dearth and famine who live in the very bosom of abundance.

From the province of Duquella to the south of the empire, there are forests of the arga tree, which is thorny, irregular in its form, and produces a species of almond exceedingly hard, with a skin as corrosive as that of walnuts. Its fruit consists of two almonds, rough and bitter, from which an oil is produced very excellent for frying. In order to use this oil, it must be purified by fire, and set in a flame, which must be suffered to die away of itself; the most greasy and corrosive particles are consumed, and its acrid qualities are thus wholly destroyed. When the Moors gather these fruits, they bring their goats under the trees; and as the fruit falls, the animals carefully nibble off the skins. In the same province also is found the tree which produces gum sandarac; also that which yields the transparent gum; but the latter is most productive, and affords the best gum the farther we proceed southward, where the heat and night-dews may perhaps render the vegetable secretion more pure and copious.

In the province of Suz, between the 25th and 30th degrees, the inhabitants have an almond harvest, which varies little because of the mildness of the climate; but the fruit is small, for which reason they take little care of the trees, and they degenerate with time. The palm tree is common in the southern provinces of Morocco; but dates ripen there with difficulty, and few are good except in the province of Suz and toward Tafilet. On the coast of Salée and Mamora there are forests of oak, which produce acorns near two inches long. They taste like chestnuts, and are eat raw and roasted. This fruit is called *Bellote*, and is sent to Cadiz, where the Spanish ladies hold it in great estimation. The empire of Morocco also produces much wax: but since it has been subjected by the emperor to the payment of additional duties, the country people have very much neglected the care of their hives. Salt abounds in the empire, and in some places on the coast requires only the trouble of gathering. Independent of the salt-pits formed by the evaporation of the soft water, there are pits and lakes in the country whence great quantities are obtained. It is carried even as far as Tombut, whence it passes to the interior parts of Africa.

The Moors cultivate their lands only in proportion to their wants; hence two-thirds of the empire at least lie waste. Here the *doum*, that is, the fan or wild palm tree, grows in abundance; and from which those people, when necessity renders them industrious, find great advantage. The shepherds, mule-drivers, camel-drivers, and travellers, gather the leaves, of which they make mats, fringes, baskets, hats, *sboaris* or large wallets to carry corn, twine, ropes, girths, and covers for their pack-saddles. This plant, with which also they heat their ovens, produces a mild and resinous fruit that ripens in September and October. It is in form like the raisin, contains a kernel, and is astringent and very proper to temper and counteract the effects of the watery and laxative fruits, of which these people in summer make an immoderate use.

Unacquainted with the sources of wealth of which their ancestors were possessed, the Moors pretend there are gold and silver mines in the empire, which the em-

Morocco.

Minerals.

perors

Morocco.

perors will not permit to be worked, lest their subjects should thus find means to shake off their yoke. It is not improbable but that the mountains of Atlas may contain unexplored riches; but there is no good proof that they have ever yielded gold and silver. There are known iron mines in the south; but the working of them has been found so expensive, that the natives would rather use imported iron, notwithstanding the heavy duty it pays, by which its price is doubled. There are copper mines in the neighbourhood of Santa Cruz, which are not only sufficient for the small consumption of the empire, where copper is little used, but are also an object of exportation, and would become much more so were the duties less immoderate.

12
Animals.

Neither the elephant nor the rhinoceros is to be found either in this or the other states of Barbary; but their deserts abound with lions, tigers, leopards, hyenas, and monstrous serpents. The Barbary horses were formerly very valuable, and thought equal to the Arabian. Though their breed is now said to be decayed, yet some very fine ones are occasionally imported into England. Camels and dromedaries, asses, mules, and kumrahs (a most serviceable creature, begot by an ass upon a cow), are their beasts of burden. Their cows are but small, and barren of milk. Their sheep yield but indifferent fleeces, but are very large, as are their goats. Bears, porcupines, foxes, apes, hares, rabbits, ferrets, weasels, moles, cameleons, and all kinds of reptiles, are found here. Partridges and quails, eagles, hawks, and all kinds of wild-fowl, are frequent on the coast.

13
Mountains,
&c.

As to mountains, the chief are that chain which goes under the name of *Mount Atlas*, and runs the whole length of Barbary from east to west, passing through Morocco, and abutting upon that ocean which separates the eastern from the western continent, and is from this mountain called the *Atlantic Ocean*. See *ATLAS*. The principal rivers, besides the Malva or Mulvia above-mentioned, which rises in the deserts, and running from south to north divides Morocco from the kingdom of Algiers, are the Suz, Ommirabih, Rabbata, Larache, Darodt, Sebon, Gueron, and Tensift, which rise in Mount Atlas, and fall into the Atlantic Ocean. The chief capes are Cape Threeforks on the Mediterranean, Cape Spartel at the entrance of the straits, Cape Cantin, Cape None, and Cape Rajador, on the Atlantic Ocean. Of the bays the most considerable are, the bay of Tetuan in the Mediterranean, and the bay of Tangier in the straits of Gibraltar.

14
Inland traf-
fic.

The traffic of the empire by land is either with Arabia or Negroland: to Mecca they send caravans, consisting of several thousand camels, horses, and mules, twice every year, partly for traffic, and partly on a religious account; for numbers of pilgrims take that opportunity of paying their devotions to their great prophet. The goods they carry to the east are woollen manufactures, leather, indigo, cochineal, and ostrich feathers; and they bring back from thence, silk, muslins, and drugs. By their caravans to Negroland, they send salt, silk, and woollen manufactures, and bring back gold and ivory in return, but chiefly negroes.

15
Traffic.

The caravans always go strong enough to defend themselves against the wild Arabs in the deserts of Africa and

Asia; though, notwithstanding all their vigilance, some of the stragglers and baggage often fall into their hands: they are also forced to load one half of their camels with water, to prevent their perishing with drought and thirst in those inhospitable deserts. And there is still a more dangerous enemy, and that is the sand itself: when the winds rise, the caravan is perfectly blinded with dust; and there have been instances both in Africa and Asia, where whole caravans, and even armies, have been buried alive in the sands. There is no doubt also, but both men and cattle are sometimes surprised by wild beasts, as well as robbers, in those vast deserts; the hot winds also, blowing over a long tract of burning sand, are equal almost to the heat of an oven, and destroy abundance of merchants and pilgrims. If it was not for devotion, and in expectation of very great gains, no man would undertake a journey in these deserts; great are the hazards and fatigues they must of necessity undergo; but those that go to Mecca assure themselves of paradise if they die, and have uncommon honours paid them at home if they survive. People crowd to be taken into the eastern caravans; and the gold that is found in the south make them no less eager to undertake that journey.

The natives have hardly any trading vessels, but are seldom without some corsairs. These, and European merchant-ships, bring them whatever they want from abroad; as linen and woollen cloth, stuffs, iron wrought and unwrought, arms, gunpowder, lead, and the like: for which they take in return, copper, wax, hides, Morocco leather, wool (which is very fine), gums, soap, dates, almonds, and other fruits. The duties paid by the English in the ports of Morocco are but half those paid by other Europeans. It is a general observation, that no nation is fond of trading with these states, not only on account of their capricious despotism, but the villany of their individuals, both natives and Jews, many of whom take all opportunities of cheating, and when detected are seldom punished.

The land-forces of the emperor of Morocco consist principally of the black troops already mentioned, and some few white; amounting altogether to an army of about 36,000 men upon the establishment, two thirds of which are cavalry. This establishment, however, upon occasion admits of a considerable increase, as every man is supposed to be a soldier, and when called upon is obliged to act in that capacity. About 6000 of the standing forces form the emperor's body guard, and are always kept near his person; the remainder are quartered in the different towns of the empire, and are under the charge of the bashaws of the provinces. They are all clothed by the emperor, and receive a trifling pay; but their chief dependence is on plunder, which they have frequent opportunities of acquiring. The soldiers have no distinction in dress from the other Moors; and are only marked by their accoutrements, which consist of a sabre, a very long musket, a small red leathern box to hold their balls, which is fixed in front by means of a belt, and a powder-horn slung over their shoulders. The army is under the direction of a commander in chief, four principal bashaws, and alcaides who command distinct divisions.

The black troops are naturally of a very fiery disposition,

Morocco.

16

Foreign
commerce.

17

Land-
forces.

Morocco. position, capable of enduring great fatigue, hunger, thirst, and every difficulty to which a military life is exposed. They appear well calculated for skirmishing parties, or for the purpose of harassing an enemy; but were they obliged to undergo a regular attack, from their total want of discipline they would soon be routed. In all their manœuvres they have no notion whatever of order and regularity, but have altogether more the appearance of a rabble than of an army. Though these troops are supposed to be the strongest support of despotism, yet from their avarice and love of variety they frequently prove the most dangerous enemies to their monarchs; they are often known to excite sedition and rebellion, and their insolence has sometimes proceeded to such excesses as nearly to overturn the government. Their conduct is governed only by the passions. Those who pay them best, and treat them with the greatest attention, they will always be most ready to support. This circumstance, independent of every other, makes it the interest of the monarch to keep his subjects in as complete a state of poverty as possible. The Moors are indeed remarkable for insincerity in their attachments, and for their love of variety; a military force, in this kingdom especially, is therefore the only means which a despotic monarch can employ for securing himself in the possession of the throne. Ignorant of every principle of rational liberty, whatever contests this devoted people may engage in with their tyrants, are merely contests for the succession; and the sole object for which they spend their lives and their property, is to exchange one merciless despot for another.

18
Navy.

The emperor's navy consists of about 15 small frigates, a few zebecks, and between 20 and 30 row-galleys. The whole is commanded by one admiral; but as these vessels are principally used for the purposes of piracy, they seldom unite in a fleet. The number of the seamen in service are computed at 6000.

19
Coins.

The coins of this empire are a fluce, a blanquil, and ducat. The fluce is a small copper coin, twenty whereof make a blanquil, of the value of two-pence Sterling. The blanquil is of silver, and the ducat of gold, not unlike that of Hungary, and worth about nine shillings. Both these pieces are so liable to be clipped and filed by the Jews, that the Moors always carry scales in their pockets to weigh them; and when they are found to be much diminished in their weight, they are recoinced by the Jews, who are masters of the mint, by which they gain a considerable profit; as they do also by exchanging the light pieces for those that are full weight. Merchants accounts are kept in ounces, ten of which make a ducat; but in payments to the government, it is said they will reckon seventeen one-half for a ducat.

20
Religion
and

With respect to religion, the inhabitants of Morocco are Mohammedans, of the sect of Ali; and have a musti or high-priest, who is also the supreme civil magistrate, and the last resort in all causes ecclesiastical and civil. They have a great veneration for their hermits, and for idiots and madmen; as well as for

those who by their tricks have got the reputation of Morocco. wizzards: all whom they look upon as inspired persons, and not only honour as saints while they live, but build tombs and chapels over them when dead; which places are not only religiously visited by their devotees far and near, but are esteemed inviolable sanctuaries for all sorts of criminals except in cases of treason.

Notwithstanding the natives are zealous Mohammedans, they allow foreigners the free and open profession of their religion, and their very slaves have their priests and chapels in the capital city; though it must be owned that the Christian slaves are here treated with the utmost cruelty. Here, as in all other Mohammedan countries, the alcoran and their comments upon it are their only written laws; and though in some instances their cadis and other civil magistrates are controlled by the arbitrary determinations of their princes, bashaws, generals, and military officers, yet the latter have generally a very great deference and regard for their laws. Murder, theft, and adultery, are commonly punished with death: and their punishments for other crimes, particularly those against the state, are very cruel; as impaling, dragging the prisoner through the streets at a mule's heels till all his flesh is torn off; throwing him from a high tower upon iron hooks; hanging him upon hooks till he die; crucifying him against a wall; and, indeed, the punishment and condemnation of criminals is in a manner arbitrary. The emperor, or his bashaws, frequently turn executioners; shoot the offender, or cut him to pieces with their own hands, or command others to do it in their presence.

The inhabitants of the empire of Morocco, known by the name of *Moors*, are a mixture of Arabian and African nations formed into tribes; with the origin of whom we are but imperfectly acquainted. These tribes, each strangers to the other, and ever divided by traditional hatred or prejudice, seldom mingle. It seems probable that most of the casts who occupy the provinces of Morocco have been repulsed from the eastern to the western Africa, during those different revolutions by which this part of the world has been agitated; that they have followed the standard of their chiefs, whose names they have preserved; and that by these they, as well as the countries they inhabit, are distinguished. At present these tribes are called *cafiles* or *cabiles*, from the Arabic word *kobeila*; and they are so numerous, that it is impossible to have a knowledge of them all. In the northern provinces are enumerated Beni-Garir, Beni-Guernid, Beni-Manfor, Beni-Oriegan, Beni-Chelid, Beni-Juseph, Beni-Zaruol, Beni-Razin, Beni-Gebara, Beni-Buseibet, Beni-Gualid, Beni-Yeder, Beni-Gueiaghel, Beni-Guaseval, Beni-Guamud, &c. Toward the east are, Beni-Sayd, Beni-Teusin, Beni-Iessetin, Beni-Buhalel, Beni-Telid, Beni-Sossian, Beni-Becil, Beni-Zequer, &c.—and to the south, those of Beni-Fonsecara, Beni-Aros, Beni-Hassen, Beni-Mager, Beni-Bafil, Beni-Seba, with an infinite number of others. (A). The people

(A) The word *Ben*, that is to say "Son," is usually employed to signify "family descendants;" thus, *Beni-Hassen*, and *Beni-Juseph*, signify, "the children or descendants of Hassen and of Joseph." The Moors, as a more extensive generic term, call men *Ben-Adam*; that is, "the descendants or sons of Adam."

²² **Morocco.** people who depend on Algiers, Tunis, and Tripoli, are in like manner divided into an infinite number of these tribes, who are all so ancient that they themselves have not the least idea of their origin.

The native subjects of the empire of Morocco may be divided into two principal classes; the *Brebes* and the *Moors*.

²³ **The Brebes, or Moun-
taineers.** The etymology of the name, and the origin of the people, of the first class, are equally unknown. Like the Moors, at the time of the invasion by the Arabs, they may have adopted the Mahometan religion, which is consonant to their manners and principal usages; but they are an ignorant people, and observe none of the precepts of that religion, but the aversion it enjoins against other modes of worship.—Mahometanism has not obliterated the customs and ancient prejudices of these people, for they eat the wild boar; and in places where there are vineyards, they drink wine, *provided* (say they) *that it is of our own making*. In order to preserve it in the southern parts of Mount Atlas, they put it in earthen vessels, and in barrels made of the hollowed trunk of a tree, the upper end of which is done over with pitch; and these are deposited in cellars, or even in water. In the northern province of Rif they boil it a little, which renders it less apt to inebriate, and perhaps they think that in this state they may reconcile the use of it with the spirit of their law.

Confined to the mountains, the Brebes preserve great animosity against the Moors, whom they confound with the Arabs, and consider as usurpers.—They thus contract in their retreats a ferocity of mind, and a strength of body, which makes them more fit for war and every kind of labour than the Moors of the plain in general are. The independence they boast of gives even a greater degree of expression to their countenance. The prejudices of their religion make them submit to the authority of the emperors of Morocco; but they throw off the yoke at their pleasure, and retire into the mountains, where it is difficult to attack or overcome them. The Brebes have a language of their own, and never marry but among each other. They have tribes or cafiles among them who are exceedingly powerful both by their number and courage. Such are those of Gomera on the borders of Rif, of Gayroan toward Fez, of Timoor extending along mount Atlas from Mequinez to Tedla, of Shavoya from Tedla to Duquella, and of Mish-boya, from Morocco to the south. The emperor of Morocco keeps the children of the chiefs of these tribes at court as hostages for their fidelity. The Brebes have no distinction of dress; they are always clothed in woollen like the Moors; and, though they inhabit the mountains, they rarely wear any thing on their heads. These mountaineers, as well as their wives, have exceedingly fine teeth; and possess a degree of vigour and intrepidity which distinguishes them from the inhabitants of the plains. It is common for them to hunt lions and tigers; and the mothers have a custom of decorating their children with a tiger's claw or the remnant of a lion's hide on the head, thinking that by this means they will acquire strength and courage; and from a similar superstition, young wives are in use to give their husbands the same as a sort of amulets.

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The Brebes and the Shellu having a language common to themselves, and unknown to the Moors, both must have had the same origin, notwithstanding the difference there is in their mode of life. The *Shellu* live on the frontiers of the empire toward the south; their population is by no means so great as that of the Brebes, nor are they so ferocious: they do not marry with other tribes; and though they practise many superstitious rites, they are faithful observers of their religion.

The *Moors* of the plains may be distinguished into those who lead a pastoral life, and those who inhabit the cities.

The former live in tents; and that they may allow their ground a year's rest, they annually change the place of their encampments, and go in search of fresh pasturage; but they cannot take this step without acquainting their governor. Like the ancient Arabs, they are entirely devoted to a pastoral life: their encampments, which they call *douhars*, are composed of several tents, and form a crescent; or they are ranged in two parallel lines, and their flocks, when they return from pasture, occupy the centre. The entrance of the douhar is sometimes shut with faggots of thorns; and the only guard is a number of dogs, that bark incessantly at the approach of a stranger. Each douhar has a chief, subordinate to an officer of the highest rank, who has under his administration a number of camps; and several of these subordinate divisions are united under the government of a bacha, who has often 1000 douhars in his department.

The tents of the Moors, viewed in front, are of a conical figure; they are from 8 to 10 feet high, and from 20 to 25 feet long; like those of high antiquity, they resemble a boat reversed. They are made of cloth composed of goats and camels hair, and the leaves of the wild palm, by which they are rendered impervious to water; but at a distance their black colour gives them a very disagreeable look.

²⁴ The Moors, when encamped, live in the greatest simplicity, and exhibit a faithful picture of the inhabitants of the earth in the first ages of the world. The nature of their education, the temperance of the climate, and the rigour of the government, diminish the wants of the people, who find in their plains, in the milk and wool of their flocks, every thing necessary for food and cloathing. Polygamy is allowed among them; a luxury so far from being injurious to a people who have few wants, that it is a great convenience in the economy of those societies, because the women are intrusted with the whole care of the domestic management. In their half-closed tents, they are employed in milking the cows for daily use; and when the milk abounds, in making butter, in picking their corn, their barley, and pulse, and grinding their meal, which they do daily in a mill composed of two stones about 18 inches in diameter, the uppermost having a handle, and turning on an axis fixed in the under one: they make bread likewise every day, which they bake between two earthen plates, and often upon the ground after it has been heated by fire. Their ordinary food is the *cooscoosoo*; which is a paste made with their meal in the form of small grains like Italian paste. This *cooscoosoo* is dressed in the vapour of boiling soup, in a hollow dish perforated with many small holes in the bot-

²⁵ Their simple way of life.

²⁶ Occupations of the women, &c.

tom,

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tom, and the dish is inclosed in a kettle where meat is boiled; the cooscoofoo, which is in the hollow dish, grows gradually soft by the vapour of the broth, with which it is from time to time moistened. This simple food is very nourishing, and even agreeable when one has got the better of the prejudices which every nation entertains for its own customs. The common people eat it with milk or butter indifferently; but those of higher rank, such as the governors of provinces and lieutenants, who live in the centre of the encampments, add to it some succulent broth, made with a mixture of mutton, poultry, pigeons, or hedgehogs, and then pour on it a sufficient quantity of fresh butter. These officers receive strangers in their tents with the same cordiality that Jacob and Laban showed to their guests. Upon their arrival a sheep is killed and immediately dressed; if they are not provided with a spit, they instantly make one of wood; and this mutton roasted at a brisk fire, and served up in a wooden dish, has a very delicate colour and taste.

The women in their tents likewise prepare the wool, spin it, and weave it into cloth on looms suspended the whole length of the tent. Each piece is about five ells long and one and an half broad; it is neither dressed nor dyed, and it has no seam; they wash it when it is dirty; and as it is the only habit of the Moors, they wear it night and day. It is called *Haique*, and is the true model of the ancient draperies.

27
Dress, &c.

The Moors of the plain wear nothing but their woollen stuff; they have neither shirts nor drawers. Linen among these people is a luxury known only to those of the court or the city. The whole wardrobe of a country Moor in easy circumstances consists in a *haique* for winter, another for summer, a red cape, a hood, and a pair of slippers. The common people both in the country and in towns wear a kind of tunick of woollen cloth, white, grey, or striped, which reaches to the middle of the leg, with great sleeves and a hood; it resembles the habit of the Carthusians.

The women's dress in the country is likewise confined to a *haique*, which covers the neck and the shoulders, and is fastened with a silver clasp. The ornaments they are fondest of are ear-rings, which are either in the form of rings or crescents, made of silver, bracelets, and rings for the small of the leg; they wear these trinkets at their most ordinary occupations; less out of vanity than because they are unacquainted with the use of caskets or cabinets for keeping them. They also wear necklaces made of coloured glass-beads or cloves strung on a cord of silk.

Besides these ornaments, the women, to add to their beauty, imprint on their face, their neck, their breast, and on almost every part of their body, representations of flowers and other figures. The impressions are made with a piece of wood stuck full of needles; with the points of which they gently puncture the skin, and then lay it over with a blue-coloured substance or gunpowder pulverised, and the marks never wear out. This custom, which is very ancient, and which has been practised by a variety of nations, in Turkey, over all Asia, in the southern parts of Europe, and perhaps over the whole globe, is, however, not general among the Moorish tribes.

The Moors consider their wives less in the light of

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companions than in that of slaves destined to labour. Except in the business of tillage, they are employed in every servile operation; nay, to the shame of humanity, it must be owned, that in some of the poorer quarters a woman is often seen yoked in a plough along with a mule, an ass, or some other animal. When the Moors remove their *douhars*, all the men seat themselves in a circle on the ground; and with their elbows resting on their knees, pass the time in conversation, while the women strike the tents, fold them up into bundles, and place them on the backs of their camels or oxen. The old women are then each loaded with a parcel, and the young carry the children on their shoulders suspended in a cloth girt round their bodies. In the more southern parts, the women are likewise employed in the care of the horses, in saddling and bridling them; the husband, who in these climates is always a despot, issues his orders, and seems only made to be obeyed.

The women travel without being veiled; they are accordingly sun-burnt, and have no pretensions to beauty. There are, however, some quarters where they put on a little rouge: they every where stain their hair, their feet, and the ends of their fingers, with an herb called *benna*, which gives them a deep saffron colour; a custom that must be very ancient among the people of Asia. Abu Becr dyed his eye-brows and beard with the same colour, and many of his successors imitated him. The custom may have originally been a religious ceremony, which the women have turned into an ornament; but it is more probable that the custom of painting the beard and hair, and that of shaving the head and using depilatories in other parts of the body, has been at first employed from motives of cleanliness in warm countries.

The marriage ceremonies of the Moors that live in tents pretty much resemble those of the same people that live in the cities. In the *douhars* they are generally most brilliant and gay; the strangers that pass along are invited, and made to contribute to the feast; but this is done more from politeness than from any mercenary motive. 28
Marriages, &c.

The tribes of the plain generally avoid mixing by marriage with one another: the prejudices that divide these people are commonly perpetuated; or, if they are partially healed, they never fail to revive upon trifling occasions, such as a strayed camel, or the preference of a pasture or a well. Marriages have sometimes taken place among them, that, so far from cementing their differences, have occasioned the most tragical scenes. Husbands have been known to murder their wives, and women their husbands, to revenge national quarrels.

Parents are not encumbered with their children, however numerous they may be, for they are very early employed in domestic affairs; they tend the flocks, they gather wood, and they assist in ploughing and reaping. In the evening, when they return from the field, all the children of the *douhar* assemble in a common tent, where the *Iman*, who himself can hardly spell, makes them read a few sentences from the *Koran* written on boards, and instructs them in their religion by the light of a fire made of straw, of bushes, and cow-dung dried in the sun. As the heat is very great

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29
Entertain-
ment of
travellers.

great in the inland parts of the country, children of both sexes go quite naked till the age of nine or ten.

The douhars dispersed over the plains are always in the neighbourhood of some rivulet or spring, and they are a kind of inns for the reception of travellers. There is generally a tent erected for their use, if they have not brought one along with them. They are accommodated with poultry, milk, and eggs, and with whatever is necessary for their horses. Instead of wood for fuel, they have the cow-dung, which, when mixed with charcoal, makes a very brisk fire. The salts that abound in the vegetables of warm countries give this dung a consistence which it has not perhaps in northern regions. A guard is always set on the tents of travellers, especially if they are Europeans, because the opinion of their wealth might tempt the avidity of the Moors, who are naturally inclined to thieving.

With respect to the roads, a very judicious policy is established, which is adapted to the character of the Moors, and to their manner of life. The douhars are responsible for robberies committed in their neighbourhood and in sight of their tents: they are not only obliged to make restitution, but it gives the sovereign a pretence for exacting a contribution proportioned to the abilities of the douhar. In order to temper the rigour of this law, they are made responsible only for such robberies as are committed during the day; those that happen after sun-set are not imputed to them, as they could neither see nor prevent them: on this account, people here travel only from sun-rising to sun-setting.

30
Markets.

To facilitate the exchange of necessaries, there is in the fields every day except Friday, which is a day of prayer, a public market in the different quarters of each province. The Moors of the neighbourhood assemble to sell and buy cattle, corn, pulse, dried fruits, carpets, haïques, and in short all the productions of the country. This market, which is called *Soc*, resembles our fairs. The bustle of the people who go and come, gives a better idea of the manner of life of the Moors than can be had in the cities. The Alcaïdes, who command in the neighbourhood, always attend these markets with soldiers to keep the peace; as it frequently happens that the grudges which these tribes harbour against one another break out upon such occasions into open violence. The dissolution of the *soc* is always the preface of some seditious squabble. The skirts of these markets are commonly occupied by merry Andrews, singers, dancers, and other buffoons, who make apes dance to amuse the idle. On one side are barbers and surgeons, to whom the sick are brought to be cured.

31
Of the
Moors who
dwell in ci-
ties.

The Moors who inhabit the cities differ from the others only in having a little more urbanity and a more easy deportment. Though they have the same origin with those of the plains, they affect to decline all intercourse with them. Some writers, without any foundation, have given the name of *Arabs* to the inhabitants of the towns, and that of *Moors* to those of the plains. But the greater part of the cities of this empire are more ancient than the invasion of the Arabs, who themselves lived in tents.

32
Their
houses and
furniture.

The houses in most of the towns in this empire appear at a little distance like vaulted tombs in a churchyard; and the entrance into the best of them has but

a mean appearance. The rooms are generally on the ground-floor, and whitened on the outside. As the roofs are quite flat, they serve as *verandos*, where the Moorish women commonly sit for the benefit of the air; and in some places it is possible to pass nearly over the whole town without having occasion to descend into the street.

As the best apartments are all backwards, a stable, or perhaps something worse, is the place to which visitors are first introduced. Upon entering the house, the stranger is either detained in this place or in the street till all the women are dispatched out of the way; he is then allowed to enter a square court, into which four narrow and long rooms open by means of large folding doors, which, as they have no windows, serve likewise to introduce light into the apartments. The court has generally in its centre a fountain; and if it is the house of a Moor of property, it is floored with blue and white chequered tiling. The doors are usually painted of various colours in a chequered form, and the upper parts of them are frequently ornamented with very curious carved work. None of the chambers have fire-places; and their victuals are always dressed in the court-yard in an earthen stove heated with charcoal. When the visitor enters the room where he is received by the master of the house, he finds him sitting cross-legged and barefooted on a mattress, covered with fine white linen, and placed on the floor or else on a common mat. This, with a narrow piece of carpeting, is in general the only furniture he will meet with in Moorish houses, though they are not destitute of other ornaments. In some, for instance, he will find the walls decorated with looking-glasses of different sizes; in others, watches and clocks in glass-cases; and in some the apartments are hung with the skins of lions or tigers, or adorned with a display of muskets and sabres. In the houses of those who live in the very first style, an European mahogany bedstead, with one or two mattresses, covered with fine white linen, is sometimes placed at each end of the room. These, however, are only considered as ornaments, as the Moors always sleep on a mattress or a mat placed upon the floor, and covered only with their *baïck* or perhaps a quilt.

As the law of Mahomet strictly proscribes the use of pictures of every description, this delightful species of ornament finds no place in the houses of the Moors.

The wardrobe of the inhabitants of cities is but little different from that of those who live in tents. Like the latter, they have a haïck, and a hood more or less fine, and have also a hood of coarse European cloth of dark blue for the winter. What farther distinguishes them from the country Moors is, that they wear a shirt and linen drawers, and an upper garment of cotton in summer, and of cloth in winter, which they call a *castan*. The white or blue hood, the purpose of which seems to be to guard against bad weather, and which is called *bernus*, is likewise a ceremonial part of dress; without which, together with sabre and canjer (or dagger) worn in a bandelier, persons of condition never appear before the emperor. Obligated as they are to conceal their riches, the Moors wear no jewels; very few have so much as a ring, a watch, or a silver snuff-box. They frequently carry a rosary

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33
Dress of
the men.

Morocco.

rosary in their hand, but without annexing any ideas of devotion to the practice, although they use it to recite the name of God a certain number of times in the day. After these momentary prayers they play with their rosary much the same as the European ladies do with their fans. The Moorish women seldom leave the house, and when they do are always veiled. The old very carefully hide their faces, but the young and handsome are somewhat more indulgent, that is to say toward foreigners, for they are exceedingly cautious with the Moors. Being veiled, their husbands do not know them in the street, and it is even impolite to endeavour to see the faces of the women who pass; so different are the manners and customs of nations. There are very fine women found among the Moors, especially up the country; those of the northern parts by no means possess the same degree of grace and beauty. As females in warm countries sooner arrive at puberty, they are also sooner old; and this perhaps may be the reason why polygamy has been generally adopted in such climates. Women there sooner lose the charms of youth, while men still preserve their passions and the powers of nature. The Moorish women are not in general very reserved. Climate has a vast influence on the temperament of the body; and licentiousness is there more general and less restrained, though as in other places its disorderly pleasures incur its attendant pains; not but that the disease attending illicit amours is less poisonous, and slower in its operations, among the Moors than in Europe, because of the heat of the climate, and the great temperance of their mode of living. The women of the south are in general the handsomest, and are said to be so reserved, or so guarded, that their very relations do not enter their houses nor their tents. Yet such is the contradictory custom of nations, that there are tribes in these same provinces among whom it is held to be an act of hospitality to present a woman to a traveller. It may be there are women who dedicate themselves to this species of devotion as to an act of benevolence; for it is impossible to describe all the varieties of opinion among men, or the whims to which the human fancy is subject.

34
Dress of the
ladies.

The Moorish women who live in cities are, as in other nations, more addicted to shew and finery in dress than those of the country; but as they generally leave the house only one day in the week, they seldom dress themselves. Not allowed to receive male visitors, they remain in their houses employed in their families, and so totally in *deshabille* that they often wear only a shift, and another coarser shift over the first, tied round their waist, with their hair plaited, and sometimes with, though often without, a cap. When dressed, they wear an ample and fine linen shift, the bosom embroidered in gold; a rich caftan of cloth, stuff, or velvet, worked in gold; and one or two folds of gauze, streaked with gold and silk, round the head, and tied behind so as that the fringes, intermingled with their tresses, descend as low as the waist; to which some add a ribband of about two inches broad, worked in gold or pearls, that encircles the forehead in form of a diadem. Their caftan is bound round their waist by a crimson velvet girdle, embroidered in gold with a buckle of gold or silver, or else a girdle of tambered stuff, manufactured at Fez.

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The women have yellow slippers, and a custom of wearing a kind of stocking of fine cloth somewhat large, which is tied below the knee and at the ankle, over which it falls in folds. This stocking is less calculated to show what we call a handsome leg, than to make it appear thick; for to be fat is one of the rules of beauty among the Moorish women. To obtain this quality, they take infinite pains, feed when they become thin on a diet somewhat like forced-meat balls, a certain quantity of which is given them daily; and, in fine, the same care is taken among the Moors to fatten young women as is in Europe to fatten fowls. The reason of a custom like this may be found in the nature of the climate and the quality of the aliments, which make the people naturally meagre. Our slender waists and fine turned ankles would be imperfections in this part of Africa, and perhaps over all that quarter of the globe; so great is the contrast of taste, and so various the prejudices of nations.

The Moors present their wives with jewels of gold, silver, or pearl, but very few wear precious stones; this is a luxury of which they have little knowledge. They have rings in silver or gold; also ear-rings in the form of a crescent, five inches in circumference, and as thick as the end of the little finger. They first pierce their ears, and introduce a small roll of paper, which they daily increase in thickness, till at length they insert the kernel of the date, which is equal in size to the ear-ring. They wear bracelets in gold and solid silver, and silver rings at the bottom of their legs, some of them considerably heavy. The use of white paint is unknown among the Moorish women, and that of red but little. It is much more common to see them dye their eyebrows and eye-lashes, which dye does not add to the beauty of the countenance, but considerably to the fire of the eyes. They trace regular features with henna, of a saffron colour, on their feet, the palm of the hand, and the tip of their fingers.—On their visiting day they wrap themselves in a clean fine haick, which comes over the head, and surrounds the face so as to let them see without being seen.—When they travel, they wear straw hats to keep off the sun; and in some parts of the empire the women wear hats on their visits; which is a fashion peculiar to the tribes coming from the south, who have preserved their customs; for the Moors do not change modes they have once adopted.

35
Negroes.

The *Negroes*, who constitute a large proportion of the emperor's subjects, and the occasion of whose introduction to this empire has been already mentioned, are better formed than the Moors; and as they are more lively, daring, and active, they are entrusted with an important share in the executive part of government. They constitute in fact the most considerable part of the emperor's army, and are generally appointed to the command of provinces and towns. This circumstance naturally creates a jealousy between them and the Moors, the latter considering the negroes as usurpers of a power which they have no right to assume. Besides those negroes which form the emperor's army, there are a great many others in the country, who either are or have been slaves to private Moors: every Moor of consequence, indeed, has his proportion of them in his service. To the disgrace of Europe, the Moors treat their slaves with humanity, employing

Morocco. ploying them in looking after their gardens, and in the domestic duties of their houses. They allow them to marry among themselves; and after a certain number of years, spontaneously present them with the invaluable boon of liberty. They soon are initiated in the Mahometan persuasion, though they sometimes intermix with it a few of their original superstitious customs. In every other respect they copy the dress and manners of the Moors.

36
Renegados.

Among the inhabitants of Morocco there is another class, of whom we must not omit to make mention. These are the *Renegados*, or foreigners who have renounced their religion for the faith of Mahomet. Of these there are a great number who have been originally Jews: they are held in little estimation by the Moors; and would be held in abhorrence by the Jews, if they durst freely express their aversion. The families of these apostates are called *Toornadis*: not having at any time married with the Moors, they still preserve their ancient characteristics, and are known almost at sight to be the progeny of those who formerly embraced the Mahometan religion. The Christian renegados are but few; and generally are fugitive peculators of Spain, or men fallen from power, who because of their misconduct, or in despair, quit one unfortunate situation for another much more deplorable.

37
Jews.

The *Jews* were formerly very numerous in this empire. After being proscribed in Spain and Portugal, multitudes of them passed over to Morocco, and spread themselves through the towns and over the country. By the relations they themselves give, and by the extent of the places assigned them to dwell in, it would appear there were more than 30,000 families, of whom at present there is scarcely a residue of one-twelfth; the remainder either having changed their religion, sunk under their sufferings, or fled from the vexations they endured, and the arbitrary taxes and tolls imposed upon them. The Jews possess neither lands nor gardens, nor can they enjoy their fruits in tranquillity: they must wear only black; and are obliged, when they pass near mosques, or through streets in which there are sanctuaries, to walk barefoot. The lowest among the Moors imagines he has a right to ill-treat a Jew; nor dares the latter defend himself, because the koran and the judge are always in favour of the Mahometan.—Notwithstanding this state of oppression, the Jews have many advantages over the Moors: they better understand the spirit of trade; they act as agents and brokers, and profit by their own cunning and the ignorance of the Moors. In their commercial bargains many of them buy up the commodities of the country to sell again. Some have European correspondents; and others are mechanics, such as goldsmiths, tailors, gunsmiths, millers, and masons. More industrious, artful, and better informed than the Moors, the Jews are employed by the emperor in receiving the customs, coining the money, and in all affairs and intercourse which the monarch has with the European merchants, as well as in all his negotiations with the various European governments.

38
State of knowledge among the Moors.

The Moors, who derive their language and religion from the Arabs, seem not in any manner to have participated of their knowledge. United and confounded as those of Morocco have been with the Moors of

Morocco. Spain, the latter of whom cultivated the arts and gave birth to Averroes, and many other great men, the Moors of this empire have preserved no traces of the genius of their ancestors. They have no conception of the speculative sciences. Education consists merely in learning to read and write; and as the revenues of the learned are derived from these talents, the priests and talbes among them are the sole depositories of this much knowledge: the children of the Moors are taught in their schools to read and repeat some sixty lessons, selected from the Koran, which for the sake of economy are written upon small boards. These lessons being once learned, the scholar is supposed to have obtained sufficient knowledge to leave school: on this occasion he rides on horseback through the city, followed by his comrades, who sing his praises: this to him is a day of triumph; to the scholars an incitement to emulation, a festival for the master, and a day of expence for the parents; for in all countries, wherever there are festivals and processions, there also are eating and drinking. At Fez there is some small degree more of instruction to be obtained in the schools; and the Moors who are a little wealthy send their children thither to have them instructed in the Arabic language, and in the religion and laws of their country. Here some of them also acquire a little taste for poetry.

The Moors who formerly inhabited Spain gave great application to physic and astronomy; and they have left manuscripts behind them which still remain monuments of their genius. The modern Moors are infinitely degenerate: they have not the least inclination to the study of science; they know the properties of some simples; but as they do not proceed upon principle, and are ignorant of the causes and effects of diseases, they generally make a wrong application of their remedies. Their most usual physicians are their talbes, their fakirs, and their saints, in whom they place a superstitious confidence. Astronomy is entirely or almost unknown to the Moors; for though they likewise wander from place to place, there are few if any among them who have a knowledge of the motion of the heavens, or who are capable from principle to direct their own course by observing the course of the stars. They are therefore necessarily wholly unable to calculate eclipses, which they always interpret to portend evil.

Superstitious people, indeed, have every where supposed eclipses were sent to presage some calamity.—The Moors being unable to reason on the causes of such an appearance, imagine the sun or the moon are in the power of a dragon that swallows them; and they offer up prayers that these luminaries may be delivered from an enemy so cruel and voracious.

Notwithstanding the Moors have occupied themselves little in the study of astronomy, they have been eager after astrology. This imaginary science, which made so rapid a progress at Rome in despite of the edicts of the emperors, may be conceived to make still greater advances among a people wholly stupid and ignorant, and ever agitated by the dread of present evils, or the hope of a more happy futurity. Magic, the companion of astrology, has here also found its followers, and is particularly studied by the talbes in the southern parts, who successfully use it in imposing upon

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Moorish credulity with strange dreams and ambiguous forebodings and prophecies.

In short, arts and sciences seem to be almost unknown in Morocco; or if at all cultivated, it is only by the Jews, who indeed are the only industrious and ingenious people in the country. The Moors in general may be considered as existing in the pastoral state, following only a few mechanical trades, and leaving every thing that requires invention to the Jews, who have likewise the principal management of their commercial and pecuniary matters; and even those few of the Moors who are merchants, are obliged to have Jew agents, for the purpose of transacting their business.

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Manufactures and trades.

The Moorish manufactures are — The haick, which, as was before observed, is a long garment composed of white wool and cotton, or cotton and silk woven together, and is used by the Moors for the purpose of covering their under dress when they go abroad, which they do by totally wrapping themselves in it in a careless but easy manner; silk handkerchiefs of a particular kind, prepared only at Fez; silks chequered with cotton; carpeting, little inferior to that of Turkey; beautiful matting, made of the palmetto or wild palm tree; paper of a coarse kind; cordovan, commonly called *Morocco leather*; gunpowder of an inferior nature; and long-barrelled muskets, made of Biscay iron. The Moors are unacquainted with the mode of casting cannon; and therefore those few which are now in the country are obtained from Europeans. — The manufacture of glass is likewise unknown to them; as indeed they make great use of earthen ware, and have few or no windows to their houses, this commodity may be of less importance to them than many others. They make butter, by putting the milk into a goat-skin, with its outward coat turned inwards, and shaking it till the butter collects on the sides, when it is taken out for use. From this operation it proves always full of hairs, and has an insipid flavour. Their cheese consists merely of curds hardened and dried, and has uniformly a disagreeable taste. The bread in some of the principal towns, particularly at Tangier and Salee, is remarkably good, but in many other places it is coarse, black, and heavy.

The Moors, agreeably to the Jewish custom, cut the throats of all the animals they eat, at the same time turning their heads towards Mecca, in adoration of their prophet. After suffering them to bleed freely, they carefully wash all the remaining blood away, and divide the meat into small pieces, of about one or two pounds in weight. As they are unacquainted with the invention of pumps, and have but few springs, it affords employment to a number of indigent people, who would probably be idle otherwise, to carry water in skins from the nearest river or reservoir, and sell it to the inhabitants. From their being obliged to tar the skins to prevent them from leaking, the water is frequently rendered very unpleasant.

Their looms, forges, ploughs, carpenters tools, &c. are much upon the same construction with the unimproved instruments of the same kind which are used at this time in some parts of Europe, only still more clumsily finished. In their work, they attend more to strength than neatness or convenience; and, like all

other ignorant people, they have no idea that what they do is capable of improvement. It is probable, indeed, that the Moors have undergone no very material change since the revolution in their arts and sciences, which took place soon after their expulsion from Spain. Previous to that period, it is well known they were an enlightened people, at a time when the greater part of Europe was involved in ignorance and barbarism; but owing to the weakness and tyranny of their princes, they gradually sunk into the very opposite extreme, and may now be considered as but a few degrees removed from a savage state.

They use no kind of wheel-carriage; and therefore all their articles of burden are transported from one place to another on camels, mules, or asses. Their buildings, though by no means constructed on any fixed principle of architecture, have at least the merit of being very strong and durable. The manner of preparing tabby, of which all their best edifices are formed, is the only remain of their ancient knowledge at present existing. It consists of a mixture of mortar and very small stones, beaten tight in a wooden case, and suffered to dry, when it forms a cement equal to the solid rock. There are always unaccountable discrepancies and inconsistencies in the arts of uncivilized nations. The apartments are, if possible, even more inconvenient than those of their neighbours the Spaniards; but the carved wood-work with which many of them are ornamented, is equal to any in Europe.

Their mosques or places of public worship are usually large square buildings, composed of the same materials as the houses. The building consists of broad and lofty piazzas, opening into a square court, in a manner in some degree similar to the Royal Exchange of London. In the centre of the court is a large fountain, and a small stream surrounds the piazzas, where the Moors perform the ceremony of ablution. The court and piazzas are floored with blue and white chequered tiling, and the latter are covered with matting, upon which the Moors kneel while repeating their prayers. In the most conspicuous part of the mosque, fronting the east, stands a kind of pulpit, where the talbe or priest occasionally preaches. The Moors always enter this place of worship bare-footed, leaving their slippers at the door. On the top of the mosque is a square steeple with a flag-staff, whither at stated hours the talbe ascends, hoists a white flag, and calls the people to prayers, for they have no bells. From this high situation the voice is heard at a considerable distance; and the talbes have a monotonous mode of enunciation, the voice sinking at the end of every short sentence, which in some measure resembles the sound of a bell. The moment the flag is displayed, every person forsakes his employment, and goes to prayers. If they are near a mosque, they perform their devotions within it, otherwise immediately on the spot where they happen to be, and always with their faces towards the east, in honour of their prophet Mahomet, who it is well known was buried at Medina. The prayer which is generally repeated on these occasions, is a chapter from the Koran, acknowledging the goodness of God and Mahomet; and it is accompanied with various gestures, such as lifting the hands above the head, bowing twice, performing two genuflexions,

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Religious ceremonies.

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nusflexions, bowing again twice, and kissing the ground. The whole of this ceremony they repeat three times.

Their sabbath is on our Friday, and commences from six o'clock the preceding evening. On this day they use a blue flag instead of the white one. As it has been prophesied that they are to be conquered by the Christians on the sabbath-day, the gates of all the towns and of the emperor's palaces are shut when at divine service on that day, in order to avoid being surprised during that period. Their talbes are not distinguished by any particular dress.

The Moors have three solemn devotional periods in the course of the year. The first, which is named *Aid de Cabier*, is held in commemoration of the birth of Mahomet. It continues seven days; during which period, every person who can afford the expence kills a sheep as a sacrifice, and divides it among his friends. The second is the *Amadam*. This is held at the season when Mahomet disappeared in his flight from Mecca to Medina. Every man is obliged at that period to fast (that is, to abstain from animal-food from sunrise to sun-set each day) for 30 days; at the expiration of which time a feast takes place, and continues a week. The third is named *Llashore*, and is a day set apart by Mahomet for every person to compute the value of his property, in order for the payment of *zakat*, that is, one-tenth of their income to the poor, and other pious uses. Although this feast only lasts a single day, yet it is celebrated with far greater magnificence than either of the others.

The Moors compute time by lunar months, and count the days of the week by the first, second, third, &c. beginning from our Sunday. They use a common reed for writing, and begin their manuscripts from right to left.

The Moors of the empire of Morocco, as well as those to the northern limits of Africa, speak Arabic; but this language is corrupted in proportion as we retire farther from Asia, where it first took birth; the intermixture which has happened among the African nations, and the frequent transmigrations of the Moors, during a succession of ages, have occasioned them to lose the purity of the Arabic language; its pronunciation has been vitiated, the use of many words lost, and other foreign words have been introduced without thereby rendering it more copious; the pronunciation of the Africans, however, is softer to the ear and less guttural than that of the Egyptians. The language, when written, is in effect much the same at Morocco as at Cairo, except that there are letters and expressions among the Moors which differ from those of the Oriental Arabs, who, however, understand the Moors in conversation, notwithstanding their vitiated manner of pronouncing. They mutually read each others writings with some difficulty.

There is a very sensible difference among the Moors between the Arabic of the learned and the courtiers, and that spoken by the people in general; and this difference is felt still more in the provinces of the south or of the east, and among the Moors who live in the deserts, where the Arabic is yet farther distinguished by a mixture of foreign tribes.

The Brebes and the Shellu, who appear to have had the same origin, for they have preserved the same dia-

lect, speak a language which the Moors do not understand, and which seems to have no analogy with that of the latter. It has been conjectured to be the Punic, or the Numidian; but these people write it in Arabic characters. The Brebes count the days of the week like the Moors, and both of them employ Arabic words. The Shellu enumerate the days after the same method, but in their own language. Both the Brebes and the Shellu denote the months of the year in the same manner as do the Moors and Arabs, and date from the same æra; that is to say, from the year of the Hegira.

The Koran and books of prayer of the Brebes and Shellu are in Arabic; as likewise are their acts and title-deeds, which are written by their talbes or learned men.

The Moors are naturally of a grave and pensive disposition, fervid in professions of friendship, but very insincere in their attachments. They have no curiosity, no ambition of knowledge; an indolent habit, united to the want of mental cultivation, renders them perhaps even more callous than other unenlightened people to every delicate sensation; and they require more than ordinary excitement to render them sensible of pleasure or of pain. This languor of sentiment is, however, unaccompanied with the smallest spark of courage or fortitude. When in adversity, they manifest the most abject submission to their superiors; and in prosperity their tyranny and pride is insupportable. They frequently smile, but seldom are heard to laugh loud. The most infallible mark of internal tranquillity and enjoyment is when they amuse themselves with stroking or playing with their beard. When roused by resentment, their disputes rarely proceed further than violently to abuse each other in the most opprobrious language. They never fight or box with their fists like our peasantry; but when a quarrel proceeds to great extremities, they collar each other, and sometimes terminate a dispute by assassination.

Personal cleanliness has been considered as one of those circumstances which serve to mark and determine the civilization of a people. It was in vain that Mahomet enjoined the frequency of ablution as a religious duty to the Moors. Their dress, which should be white, is but seldom washed; and their whole appearance evinces that they perform this branch of their religious ceremonies in but a slovenly manner. With this degree of negligence as to their persons, we may be justly surprised to find united a most scrupulous nicety in their habitations and apartments. They enter their chambers barefooted, and cannot bear the slightest degree of contamination near the place where they are seated. This delicacy again is much confined to the insides of their houses. The streets receive the whole of their rubbish and filth; and by these means the ground is so raised in most parts of the city of Morocco, that the new buildings always stand considerably higher than the old.

When a Moor receives his guests, he never rises from his seat, but shakes hands, inquires after their health, and desires them to sit down, either on a carpet or a cushion placed on the floor for that purpose. Whatever be the time of day, tea is then brought in on a tea-board with short feet. This is the highest

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Language
of the
Moors.

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Their tena-
per and
disposition.

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Mode of li-
ving, man-
ners, &c.

Morocco. compliment that can be offered by a Moor; for tea is a very expensive and scarce article in Barbary, and is only drank by the rich and luxurious. Their manner of preparing it is by putting some green tea, a small quantity of tansey, the same portion of mint, and a large proportion of sugar (for the Moors drink their tea very sweet) into the tea-pot at the same time, and filling it up with boiling water. When these articles are infused a proper time, the fluid is then poured into remarkably small cups of the best India china, the smaller the more genteel, without any milk; and accompanied with some cakes or sweetmeats, it is handed round to the company. From the great esteem in which this beverage is held by the Moors, it is generally drank by very small and slow sips, that its flavour may be the longer enjoyed; and as they usually drink a considerable quantity whenever it is introduced, this entertainment is seldom finished in less time than two hours.

The other luxuries of the Moors are snuff, of which they are uncommonly fond, and smoking tobacco, for which the greater part use wooden pipes about four feet in length, with an earthen bowl; but the princes or emperor generally have the bowls made of solid gold. Instead of the indulgence of opium, which, from the heavy duty imposed upon that article by the emperor, is too expensive to be used by the Moors, they substitute the *achicha*, a species of flax. This they powder and infuse in water in small quantities. The Moors assert, that it produces agreeable ideas; but own, that when it is taken to excess it most powerfully intoxicates. In order to produce this effect, they likewise mix with their tobacco an herb named in this country *khaf*, which by smoking occasions all the inebriating effects of the *achicha*. The use of spirits as well as wine is strictly forbidden by the Koran; there are, however, very few among the Moors who do not joyfully embrace every private opportunity of drinking both to excess.

With respect to the hours for eating, the people of this country are remarkably regular. Very soon after day-break they take their breakfast, which is generally a composition of flour and water boiled thin, together with an herb which gives it a yellow tinge. The male part of the family eat in one apartment and the female in another. The children are not permitted to eat with their parents, but take their meals afterwards with the servants; indeed in most other respects they are treated exactly as servants or slaves by their parents. The mess is put into an earthen bowl, and brought in upon a round wooden tray. It is placed in the centre of the guests, who sit cross-legged either on a mat or on the floor, and who form a circle for the purpose. Having previously washed themselves, a ceremony always performed before and after meals, each person with his spoon attacks vigorously the bowl, while they diversify the entertainment by eating with it fruit or bread. At 12 o'clock they dine, performing the same ceremonies as at breakfast. For dinner, from the emperor down to the peasant, their dish is universally *cooscoosoo*, the mode of preparing which has been already described. The dish is brought in upon a round tray and placed on the floor, round which the family sit as at breakfast, and with their fin-

gers commit a violent assault on its contents: they are at the same time, however, attended by a slave or domestic, who presents them with water and a towel occasionally to wash their hands. From the want of the simple and convenient invention of knives and forks, it is not uncommon in this country to see three or four people pulling to pieces the same piece of meat, and afterwards with their fingers stirring up the paste or *cooscoosoo*, of which they often take a whole handful at once into their mouth. At sun-set they sup upon the same dish; and indeed supper is their principal meal.

Such is the general mode of living among the principal people in towns. There are considerable multitudes, however, who do not fare so well, but are obliged to content themselves with a little bread and fruit instead of animal food, and to sleep in the open streets. This kind of existence seems ill calculated to endure even in an inactive state; far more severe must it therefore be to those who exercise the laborious employment of couriers in this country, who travel on foot a journey of 300 or 400 miles at the rate of between 30 or 40 miles a-day, without taking any other nourishment than a little bread, a few figs, and some water, and who have no better shelter at night than a tree. It is wonderful with what alacrity and perseverance these people perform the most fatiguing journeys at all seasons of the year. There is a regular company of them in every town, who are ready to be dispatched at a moment's warning to any part of the country their employers may have occasion to send them. They constitute in this empire the only mode of conveyance for all public and private dispatches; and as they are well known in the place to which they belong, they are very punctual in delivering every thing that is put into their hands. From their steady pace in travelling, at the rate of about four miles an hour, and from their being able to pass over parts which from the mountainous state of the country, and from the want of good roads, persons on horseback would find inaccessible, they are indeed by far the most expeditious messengers that could be employed.

As none but the very vulgar go on foot in this country, for the purpose of visiting mules are considered as more genteel than horses; and the greatest pride of a Moor is to have such as walk remarkably fast, and to keep his footmen, of which the number is proportionable to the rank and consequence of the master, on a continued run.

As the Moors are not fond of admitting men into their houses except upon particular occasions, if the weather is fine they place a mat, and sometimes a carpet, on the ground before their door, seat themselves upon it cross-legged, and receive their friends, who form a circle, sitting in the same manner, with their attendants on the outside of the groupe. Upon these occasions they either drink tea or smoke and converse. The streets are sometimes crowded with parties of this kind; some engaged in playing at an inferior kind of chess or drafts, at which they are very expert; but the majority in conversation. The people of this country, indeed, are so decidedly averse to standing up, or walking about, that if only two or three

^{Morocco.} three people meet, they squat themselves down in the first clean place they can find, if the conversation is to hold but for a few minutes.

The manner of salutation among the Moors is, when two equals meet, by a quick motion they shake hands, and afterwards kiss each other's hand. When an inferior meets a superior, such as an officer of rank, a judge, or governor, he kisses that part of his haick which covers the arm; and sometimes, as a higher mark of respect, he will kiss his feet. But the compliment due to the emperor, or any of the princes of the blood, is to take off the cap or turban, and to prostrate the head to the ground. When two particular friends or relations meet, they anxiously embrace and kiss each other's faces and beards for a few minutes, make a number of enquiries about the health of each party, as well as that of their families, but seldom allow time for a reply.

⁴⁴
Their a-
musements.

The Moors have in general but few amusements; the sedentary life they lead in cities is little variegated except by the care they take of their gardens, which are rather kept for profit than pleasure. Most of these gardens are planted with the orange, the lemon tree, and the cedar, in rows, and in such great quantities, that the appearance is rather that of a forest than that of a garden. The Moors sometimes, though rarely, have music in these retreats: a state of slavery but ill agrees with the love of pleasure: the people of Fez alone, either from a difference in education, or because their organs and sensibility are more delicate, make music a part of their amusements. There are not in Morocco, as in Turkey, public coffee-houses, where people meet to enquire the news of the day; but instead of these, the Moors go to the barbers shops, which in all countries seem to be the rendezvous of newsmongers. These shops are surrounded by benches; on which the customer, the inquisitive, and the idle, seat themselves; and when there are no more places vacant, they crouch on the ground like monkeys.

Showmen and dancers come often into the towns; round whom the people assemble and partake of the amusement for a very trifle. There are also a kind of wandering historians: the vulgar, who cannot read, and who every where are eager to hear extraordinary relations, are the more assiduous in attending these narrators, as want of more extensive information prevents the tale-teller remaining above a week in a place.

A common diversion in the towns where there are soldiers, as well as in the country, is what the Moors call the game of gun-powder; a kind of military exercise that is the more pleasing to these people, inasmuch as, by the nature of their government, they all are, or are liable to become, soldiers, therefore all have arms and horses. By explosions of powder, too, they manifest their festivity on their holidays. Their game of gun-powder consists in two bodies of horse, each at a distance from the other, galloping in successive parties of four and four, and firing their pieces charged with powder. Their chief art is in galloping up to the opposite detachment, suddenly stopping, firing their muskets, facing about, charging, and returning to the attack; all which manœuvres are imitated by their opponents. The Moors take great pleasure in

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this amusement, which is only an imitation of their military evolutions. ^{Morocco.}

The common topics for conversation among the Moors, are the occurrences of the place, religion, ⁴⁵ Management of their women, but above all their horses. This last topic, indeed, appears to occupy by far the greatest portion of their attention. These animals are seldom kept in stables in Morocco. They are watered and fed only once a-day, the former at one o'clock at noon, and the latter at sun-set; and the only one mode which they use to clean them is by washing them all over in a river two or three times a week, and suffering them to dry themselves.

Notwithstanding the attachment which the Moors manifest to their horses, they most certainly use them with great cruelty. Their highest pleasure, and one of their first accomplishments, is, by means of long and sharp spurs, to make the horse go full speed, and then to stop him instantaneously; and in this they certainly manifest uncommon dexterity. The iron-work of their bridles is so constructed, that by its pressure on the horse's tongue and lower jaw, with the least exertion of the rider, it fills his mouth full of blood; and if not used with the utmost caution, throws him inevitably on his back. The bridle has only a single rein, which is so very long, that it serves the purpose of both whip and bridle. The Moorish saddle is in some degree similar to the Spanish, but the pommel is still higher and more peaked. Their stirrups, in which they ride very short, are so formed as to cover the whole of the foot. They either plate or gild them, according to the dignity, opulence, or fancy of the possessor. Their saddles, which are covered with red woollen cloth, or if belonging to a person of consequence with red satin or damask, are fastened with a strong girth round the body in the European style, and another round the shoulders. The Moors frequently amuse themselves by riding with the utmost apparent violence against a wall; and a stranger would conceive it impossible for them to avoid being dashed to pieces, when just as the horse's head touches the wall, they stop him with the utmost accuracy.

Like all barbarous nations, the Moors are passionately fond of music, and some few have a taste for ⁴⁶ Love of poetry. Their slow airs, for want of that variety which is introduced when the science has attained a degree of perfection, have a very melancholy sameness; but some of their quick tunes are beautiful and simple, and partake in some degree of the characteristic melody of the Scotch airs. The poetry of their songs, the constant subject of which is love, though there are few nations perhaps who are less sensible of that passion, has certainly less merit than the music.

Their instruments are a kind of hautboy, which differs from ours only in having no keys; the mandoline, which they have learnt to play upon from their neighbours the Spaniards; another instrument, bearing some resemblance to a violin, and played upon in a similar manner, but with only two strings; the large drum, the common pipe, and the tabor. These united, and accompanied with a certain number of voices, upon many occasions form a band, though solo music is more common in this unsocial country. Upon all days of rejoicing, this kind of music, repeated volleys of musketry, either by men on horseback or on foot, and

Morocco. and in the evening a grand attack upon the cooscooso, constitute the principal part of the public entertainments.

⁴⁷ **Marriage ceremonies.** The Moors marry very young, many of their females not being more than 12 years of age at their nuptials. As Mahometans, it is well known that their religion admits of polygamy to the extent of four wives, and as many concubines as they please; but if we except the very opulent, the people seldom avail themselves of this indulgence, since it entails on them a vast additional expence in house-keeping, and in providing for a large family. In contracting marriage, the parents of both parties are the only agents; and the intended bride and bridegroom never see each other till the ceremony is performed. The marriage-settlements are made before the cadi, and then the friends of the bride produce her portion, or if not, the husband agrees to settle a certain sum upon her in case he should die, or divorce her on account of barrenness, or any other cause. The children of the wives have all an equal claim to the effects of the father and mother, but those of the concubines can each only claim half a share.

When the marriage is finally agreed upon, the bride is kept at home eight days, to receive her female friends, who pay congratulatory visits every day. At the same time a talbe attends upon her, to converse with her relative to the solemn engagement on which she is about to enter: on these occasions he commonly accompanies his admonitions with singing a pious hymn, which is adapted to the solemnity. The bridegroom, on the other hand, receives visits from his male friends in the morning, and in the evening rides through the town accompanied by them, some playing on hautboys and drums, while others are employed in firing volleys of musketry. In all their festivals, the discharge of musketry indeed forms a principal part of the entertainment. Contrary to the European mode, which particularly aims at firing with exactness, the Moors discharge their pieces as irregularly as possible, so as to have a continual succession of reports for a few minutes.

On the day of the marriage, the bride in the evening is put into a square or octagonal cage about 12 feet in circumference, which is covered with fine white linen, and sometimes with gauzes and silks of various colours. In this vehicle, which is placed on a mule, she is paraded round the streets, accompanied by her relations and friends, some carrying lighted torches, others playing on the hautboys, and a third party again firing volleys of musketry. In this manner she is carried to the house of her intended husband, who returns about the same time from performing similar ceremonies. On her arrival, she is placed in an apartment by herself, and her husband is introduced to her alone for the first time, who finds her sitting on a silk or velvet cushion, supposing her to be a person of consequence, with a small table before her, upon which are two wax candles lighted. Her shift, or more properly shirt, hangs down like a train behind her, and over it is a silk or velvet robe with close sleeves, which at the breast and wrists is embroidered with gold; this dress reaches something lower than the calf of the leg. Round her head is tied a black silk scarf, which hangs behind as low as the ground. Thus at-

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tired, the bride sits with her hands over her eyes, when her husband appears and receives her as his wife without any further ceremony: for the agreement made by the friends before the cadi is the only specific contract which is thought necessary.

If the husband should have any reason to suspect that his wife has not been strictly virtuous, he is at liberty to divorce her and take another. For some time after marriage, the family and the friends are engaged in much feasting, and a variety of amusements, which last a longer or shorter time according to the circumstances of the parties. It is usually customary for the man to remain at home eight days and the woman eight months after they are first married; and the woman is at liberty to divorce herself from her husband, if she can prove that he does not provide her with a proper subsistence. If he curses her, the law obliges him to pay her, for the first offence eight ducats; for the second, a rich dress of still greater value; and the third time she may leave him entirely. He is then at liberty to marry again in two months.

Women suffer but little inconvenience in this country from child-bearing; they are frequently up the next day, and go through all the duties of the house with the infant upon their backs. In celebrating the rite of circumcision, the child is dressed very sumptuously, and carried on a mule, or, if the parents are in poor circumstances, on an ass, accompanied with flags flying and musicians playing on hautboys and beating drums. In this manner they proceed to the mosque, where the ceremony is performed. Children, as soon as they can be made in the least degree useful, are put to the various kinds of labour adapted to their age and strength. Others, whose parents are in better circumstances, are sometimes sent to school; and those who are intended for the church, usually continue their studies till they have nearly learnt the Koran by rote. In that case they are enrolled among the talbes, or learned men of the law; and upon leaving school are paraded round the streets on a horse, accompanied by music and a large concourse of people.

When any person dies, a certain number of women are hired for the purpose of lamentation; in the performance of which, nothing can be more grating to the ear, or more unpleasant, than their frightful moans, or rather howlings: at the same time, these mercenary mourners beat their heads and breasts, and tear their cheeks with their nails. The bodies are usually buried a few hours after death. Previous to interment, the corpse is washed very clean, and sewed up in a shroud, with the right hand under the head, which is pointed towards Mecca: it is carried on a bier supported upon mens shoulders, to the burying place, which is always, with great propriety, on the outside of the town, for they never bury their dead in the mosques, or within the bounds of an inhabited place. The bier is accompanied by numbers of people, two a-breast, who walk very fast, calling upon God and Mahomet, and singing hymns adapted to the occasion. The grave is made very wide at the bottom and narrow at the top, and the body is deposited without any other ceremony than singing and praying in the same manner as on their way to the grave. They have no tombs in this country, but long and plain stones; and it is frequently customary for the female friends

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Morocco.

⁴⁸ Circumci-
sion.

⁴⁹ Education
of children.

⁵⁰ Funeral
rites.

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Absurd
conduct
of the Eu-
ropean
powers to-
wards Mo-
rocco.

friends of the departed to weep over their graves for several days after their funeral.

It has often been thought surprising, that the Christian powers should suffer their marine to be insulted by those barbarians, who take the ships of all nations with whom they are not at peace, or rather who do not pay them a subsidy either in money or commodities. This forbearance has been accounted for no otherwise than by supposing, first, that a breach with them might provoke the Porte, who pretends to be their lord paramount; secondly, that no Christian power would be fond of seeing Algiers, and the rest of that coast, in possession of another; and, thirdly, that nothing could be got by a bombardment of any of their towns, as the inhabitants would instantly carry their effects to their deserts and mountains, so that the benefit resulting from the conquest must be tedious and uncertain.

The first reason is so obviously absurd as to require no answer. In regard to the second and third suppositions, it may be observed, that there is no necessity for taking possession of those coasts by any European power whatever. The object ought to be, not to conquer, but to render impotent, those piratical states; not to profit by plundering them, but to quash their piracies, and prevent them from being longer the nuisances and pests of the Mediterranean. Than which, according to the best informed travellers, there can be nothing more easy. Hardly any force of armament would be necessary for the purpose, would the Europeans merely leave them to their own resources, and withhold those supplies with which they have been in use to furnish them, contrary as well to good policy as to the interests of humanity. M. Lempriere †, speaking of the emperor of Morocco (1790) observes, that "nothing but gross neglect or inexcusable ignorance could induce the European princes in general to remain in a kind of tributary state to a prince who had neither an army nor a fleet which deserved the name, and a people whose disposition is less suited to enterprise than perhaps any other. What had they to fear from him? His whole fleet consisted only of a few small frigates and row-boats, ill managed and worse manned, the whole of which might have been destroyed in one day by two or three well appointed European frigates. The entrances of those ports where he laid up his shipping, if we except Tangier and Larache, are so continually choaking up with sand, that in a short time they will only admit fishing-boats, or the very smallest craft. The towns are none of them regularly fortified except Mogodore, and that hardly produces half a dozen of men who understand the least of working the guns. And yet this contemptible power gives laws to all the coasts of Portugal and Spain, and may be said in some measure to command the entrance of the Mediterranean.

"It may be said, he was too trifling a power to notice; if so, why lavish immense presents for the purpose of keeping him in temper? Those who imagined they secured his friendship by these means, were much mistaken; on the contrary, they only added fuel to that flame of avarice which was not to be extinguished. If he was one day presented with a frigate, he asked for two the next; and the more his requests were indulged, the more his inordinate desires were

increased. It is well known to those who have been conversant with the Moors, that to secure their friendship, you must first assert your own superiority; and then if you make them a trifling present, its value is trebled in their estimation. The same disposition would have been found in the late emperor as in the common Moor. So far from courting an alliance, it would rather have been good policy at once to quarrel with him; the loss of a few towns, and particularly Mogodore, to which he was much attached, from its being raised under his own auspices, would soon have reduced him to good humour and submission."

Another intelligent traveller, M. Briffon*, observes how extraordinary it is, that a prince so little to be dreaded as the emperor of Morocco should oblige the different powers of Europe to send ambassadors to him, and that he should even dictate laws to them. There is not a single sovereign who dares to send a representative to his court without making him at the same time considerable presents; and what envoy would present himself without having his hands full? How happens it that the consuls have not, by common consent, represented to their respective sovereigns, that the emperor of Morocco becomes every day more and more powerful by the supplies which they themselves furnish him? Twenty years ago this prince was absolutely destitute of resources. He had neither materials nor any place for casting cannons; and he was equally in want of wood for building ships, of ropes, of nails, and even of workmen. It is France and other European powers that assist him, else the emperor of Morocco would be of little consideration. His superb batteries of brass cannons, 24, 36, and 48 pounders, were furnished by Holland, Spain, England, and France. England has done more than other nations, by selling him those beautiful cannons which were taken on the floating batteries. Mogodore is built in an advantageous situation, its batteries are well disposed, and there are cannon at each embrasure; but they are there only in a manner for show, as they have no carriages, and are supported only by brick-work. There are no workmen in the country capable of mounting them on carriages, nor is there wood proper for making them. Did a few vessels only wait for the sailing of those small frigates, which are almost all unfit for sea except only two, nothing would be easier than to prevent them from returning, and to block up the ports of Mogodore, Rabat, and Salee. What would become of his commerce, and above all his marine, did the Christian princes cease to assist him, contrary to the interests of humanity? Would England and Spain unite only for a moment, Tangiers, his most beautiful port, would soon be so far ruined, that it could not afford shelter to his subjects, who, destitute of ships, would soon be obliged to give over their piracies. If the consuls of different nations have never made these observations, and if they have never pointed out the means of curbing the insolence of the emperor of Morocco, it is because they are at the head of the commerce which these different powers carry on in that part of the world. I can positively assert, that these representatives, instead of furnishing their courts with the means of diminishing the power of the emperor, never cease to add to his strength, and to incite him to make

† Tour,
p. 233.

Morocco.

* Shipwreck
of M. Brif-
fon.

52
Avarice
and in-
trigues of
their con-
suls.

new

Morocco. new pretensions. How much we assist these pirates, to hurt the advantageous trade which we might carry on! Their situation renders them very dangerous; but if we leave them only their situation, it would be impossible for them to profit much by it. Let impartial people pay a visit to that country, let them speak with the same sincerity as I do; and they will no doubt be convinced, that the emperor of Morocco, of all the princes in the world, would be the least able to do mischief, did the sovereigns of Europe cease to furnish him with succours."

53
Description
of the city
of Moroc-
co.

MOROCCO, a city of the kingdom of Morocco in Barbary, lying about 120 miles to the north of Tarudant, 90 to the east of Mogodere, and 350 to the south of Tangier. It is situated in a beautiful valley, formed by a chain of mountains on the northern side, and those of the Atlas, from which it is distant about 20 miles on the south and east. The country which immediately surrounds it is a fertile plain, beautifully diversified with clumps of palm trees and shrubs, and watered by small and numerous streams which descend from Mount Atlas. The emperor's out-gardens, which are situated at the distance of about five miles to the south of the city, and are large plantations of olives walled in, add considerably to the beauty of the scene.

Morocco, though one of the capitals of the empire (for there are three, Morocco, Mequinez, and Fez), has nothing to recommend it but its great extent and the royal palace. It is enclosed by remarkably strong walls built of tabby, the circumference of which is about eight miles. On these walls there are no guns mounted: but they are flanked with square towers, and surrounded by a wide and deep ditch. The city has a number of entrances, consisting of large double porches of tabby in the Gothic style, the gates of which are regularly shut every night at certain hours. As polygamy is allowed by the Mahometan religion, and is supposed in some degree to affect population, it would be difficult to form any computation near the truth with respect to the number of inhabitants which this city may contain. The mosques, which are the only public buildings except the palace worth noticing at Morocco, are more numerous than magnificent; one of them is ornamented with a very high and square tower, built of cut stone, which is visible at a considerable distance from the city. The streets are very narrow, dirty, and irregular, and many of the houses are uninhabited and falling to ruin. Those which are decent and respectable in their appearance are built of tabby, and enclosed in gardens. That of the effendi or prime minister (according to Mr Lempriere, from whose *Tour* * this account is transcribed), was among the best in Morocco. This house, which consisted of two stories, had elegant apartments both above and below, furnished in a style far superior to any thing our author ever saw in that country. The court, into which the lower apartments opened, was very neatly paved with glazed blue and white tiling, and had in its centre a beautiful fountain. The upper apartments were connected together by a broad gallery, the balusters of which were painted of different colours. The hot and cold baths were very large, and had every convenience which art could afford. Into the garden, which was laid out in a tolerably neat style, opened a room adjoining to the house, which had a broad arched

* Published
in 1791.

entrance but no door, beautifully ornamented with chequered tiling; and at both ends of the apartment the walls were entirely covered with looking-glasses. The flooring of all the rooms was covered with beautiful carpeting, the walls ornamented with large and valuable looking-glasses, intermixed with watches and clocks in glass-cases. The ceiling was carved wood-work, painted of different colours; and the whole was in a superior style of Moorish grandeur. This and a few others are the only decent habitations in Morocco. The generality of them serve only to impress the traveller with the idea of a miserable and deserted city.

The Elcaissaria is a particular part of the town where stuffs and other valuable articles are exposed to sale. It consists of a number of small shops, formed in the walls of the houses, about a yard from the ground, of such an height within as just to admit a man to sit in one of them cross-legged. The goods and drawers are so arranged round him, that when he serves his customers, who are standing all the time out in the street, he can reach down any article he wants without being under the necessity of moving. These shops, which are found in all the other towns of the empire, are sufficient to afford a striking example of the indolence of the Moors. There are three daily markets in different parts of the town of Morocco where provisions are sold, and two weekly fairs or markets for the disposal of cattle. The city is supplied with water by means of wooden pipes connected with the neighbouring streams, which empty themselves into reservoirs placed for the purpose in the suburbs, and some few in the centre of the town.

The castle is a large and ruinous building, the outer walls of which enclose a space of ground about three miles in circumference. It has a mosque, on the top of which are three large balls, formed, as the Moors allege, of solid gold. The castle is almost a town of itself; it contains a number of inhabitants, who in some department or other are in the service of the emperor, and all under the direction of a particular alcaide, who is quite independent of the governor of the town. On the outside of the castle, between the Moorish town and the Jewry, are several small distinct pavilions, inclosed in gardens of orange-trees, which are intended as occasional places of residence for such of the emperor's sons or brothers as happen to be at Morocco. As they are covered with coloured tiling, they have at a small distance rather a neat appearance; but upon approaching or entering them, that effect in a great measure ceases.

The Jews, who are at this place pretty numerous, have a separate town to themselves, walled in, and under the charge of an alcaide, appointed by the emperor. It has two large gates, which are regularly shut every evening about nine o'clock; after which time no person whatever is permitted to enter or go out of the Jewry till they are opened again the following morning. The Jews have a market of their own; and when they enter the Moorish town, castle, or palace, they are always compelled to be barefooted.

The palace is an ancient building, surrounded by a square wall, the height of which nearly excludes from the view of the spectator the other buildings. Its principal gates are constructed with Gothic arches,

Morocco
||
Moron.

composed of cut stone, which conduct to several open and spacious courts; through these it is necessary to pass before we reach any of the buildings. These open courts were used by the late emperor for the purposes of transacting public business and exercising his troops. The habitable part consists of several irregular square pavilions, built of tabby, and whitened over; some of which communicate with each other, others are distinct, and most of them receive their names from the different towns of the empire. The principal pavilion is named by the Moors the *douhar*, and is more properly the palace or seraglio than any of the others. It consists of the emperor's place of residence and the Harem, forming altogether a building of considerable extent. The other pavilions are merely for the purposes of pleasure or business, and are quite distinct from the *douhar*. The *Mogodore* pavilion, so named from the late emperor's partiality to that town, has by far the fairest claim to grandeur and magnificence. This apartment was the work of Sidi Mahomet, and is lofty and square. It is built of cut stone, handsomely ornamented with windows, and covered with varnished tiles of various colours; and its elegance and neatness, contrasted altogether with the simplicity and irregularity of the other buildings, produce a most striking effect. In the inside, besides several other apartments, we find in the pavilion a spacious room floored with blue and white chequered tiling, its ceiling covered with curiously carved and painted wood, and its stuccoed walls variously ornamented with looking-glasses and watches, regularly disposed in glass-cases. To this pavilion the late emperor manifested an exclusive preference, frequently retiring to it both for the purposes of business and of recreation. The apartments of the emperor have in general a much smaller complement of furniture than those of the Moors in the inferior walks of life. Handsome carpeting, a mattrafs on the ground covered with fine linen, a couch, and a couple of European beds, are the principal articles they contain. The gardens within the walls of the palace, of which he has several, are very neat; they contain orange and olive trees, variously disposed and arranged, and intersected with streams of water, fountains, and reservoirs. Those on the outside are nothing more than large tracts of ground, irregularly planted with olives; having four square walks, and surrounded by walls.

MOROCCO, or *Marroquin*, the skin of a goat, or some other animal resembling it, dressed in sumac or galls, and coloured of any colour at pleasure; much used in bookbinding, &c. The name is ordinarily derived from the kingdom of Morocco, whence it is supposed the manner of preparing these skins was first borrowed. We have Morocco skins brought from the Levant, Barbary, Spain, Flanders, and France; red, black, yellow, blue, &c. For the manner of preparing them, see LEATHER.

MOROCHTHUS, in natural history, an indurated clay called by us *French chalk*; serving taylor and others to mark with. The ancients esteemed it as an astringent, prescribing it in the colic, hæmorrhagies, and other fluxes.

MORON, a town of Spain, in Andalusia, seated in a pleasant fertile plain, and in the neighbourhood is

a mine of precious stones. It is 30 miles south-east of Seville. W. Long. 5. 20. N. Lat. 37. 0.

MORPETH, a handsome town of Northumberland, 14 miles from Newcastle, 286 miles from London, is an ancient borough by prescription, with a bridge over the Wansbeck. It had once an abbey and a castle, now in ruins, situated about a quarter of a mile south of the town and river Wansbeck, on an eminence which overlooks them both. The market-place is conveniently situated near the centre of the town; and an elegant town-house was built by the Carlisle family in 1714, in which the quarter-sessions is held for the county. It is built of hewn-stone, with a piazza. The church being a quarter of a mile distant from the town, a tower containing a good ring of bells stands near the market-place. Near the bridge is the county gaol, a modern structure. Here are a free grammar-school, a chapel near the river, on the site of a chantry that was granted for the support of the foundation of the school, which was part of the old structure, and an hospital for infirm people. In 1215, the townsmen themselves burnt their town, out of pure hatred to king John, that he might find no shelter there. Here is a good market on Saturday for corn, cattle, and all necessary provisions; and there is another on Wednesday, the greatest in England except Smithfield, for live cattle. This is a poll town and a thoroughfare, with many good inns, and plenty of fish; and here are several mills.—The earl of Carlisle's steward holds a court here twice a-year, one of them the Monday after Michaelmas, when four persons are chosen by the free burgesses, who are about 107, and presented to the steward, who names two of them to the bailiffs, who, with seven aldermen, are its governors for the year ensuing. Its fairs are on Wednesday, Thursday, and Friday before Whit Sunday, and the Wednesday before July 22. It sends two members to parliament.

MORPHEUS, in fabulous history, the god of sleep, or, according to others, one of the ministers of Somnus. He caused sleepiness, and represented the forms of dreams. Ovid styles him the kindest of the deities; and he is usually described in a recumbent posture, and crowned with poppies.

MORRERI (Lewis), author of the Historical Dictionary, was born at Barge-mont in Provence, 1643. He learned rhetoric and philosophy at Aix, and civinity at Lyons. At 18 years of age he wrote a small piece, intitled *Le Pays d'Amour*, and a collection of the finest French poems intitled *Doux plaisirs de la Poésie*. He learned Spanish and Italian; and translated out of Spanish into French the book intitled *La Perfection Chrétienne de Rodriguez*. He then refined the Saints Lives to the purity of the French tongue. Being ordained priest, he preached at Lyons, and undertook, when he was but 30 years of age, a new Historical Dictionary, printed at Lyons in one vol. folio, 1673. But his continual labour impaired his health; so that he died in 1680, aged 37. His second volume was published after his death; and four more volumes have since been added. He left some other works behind him.

MORRHINA VASA, were a sort of cups or vases made use of by the ancients for drinking out of, and other

Morpeth
||
Morrhina.

Morrise
Mortality

other purposes. Authors are not agreed as to the substance of which they were made. Some say it was a stone; some assert that it was a fluid condensed by being buried under ground. All that we know concerning it is, that it was known by the name of *murrha*, and that Heliogabalus's chamber pot was made of it. The word is sometimes written *myrrhina*.

MORRISSE-DANCES. See *MORISQUE-DANCES*.

MORS, DEATH, one of the infernal deities, born of Night without a father. She was worshipped by the ancients with great solemnity. She was not represented as an actually existing power, but as an imaginary being. Euripides introduces her in one of his tragedies on the stage. The moderns represent her as a skeleton armed with a scythe and a scymetar.

MORSE, in zoology. See *TRICHECUS*.

MORTALITY, a term frequently used to signify a contagious disease, which destroys great numbers of either men or beasts.

Bills of MORTALITY, are accounts or registers specifying the numbers born, married, and buried in any parish, town, or district. In general they contain only these numbers; and, even when thus limited, are of great use, by showing the degrees of healthiness and prolifickness, and the progress of population in the places where they are kept. It is therefore much to be wished, that such accounts had been always correctly kept in every kingdom, and regularly published at the end of every year. We should then have had under our inspection the comparative strength of every kingdom, as far as it depends on the number of inhabitants, and its increase or decrease at different periods. But such accounts are rendered more useful, when they include the ages of the dead, and the distempers of which they have died. In this case they convey some of the most important instructions, by furnishing us with the means of ascertaining the law which governs the waste of human life, the values of annuities dependent on the continuance of any lives, or any survivorships between them, and the favourableness or unfavourableness of different situations to the duration of human life. There are but few registers of this kind; nor has this subject, though so interesting to mankind, ever engaged much attention till lately. The first bills containing the ages of the dead were those for the town of Breslaw in Silesia. It is well known what use has been made of these by Dr Halley, and after him by De Moivre. A table of the probabilities of the duration of human life at every age, deduced from them by Dr Halley, has been published in the *Philosophical Transactions*, (see the *Abridgement*, vol. iii. p. 669.) and is the first table of this sort that has been ever published. Since the publication of this table, similar bills have been established in a few towns of this kingdom; and particularly in London, in the year 1728, and at Northampton in 1735.

Two improvements of these registers have been proposed: the first is, that the sexes of all that die in every period of life should be specified in them, under the denomination of *boys, married men, widowers, and bachelors*; and of *girls, married women, widows, and virgins*. The second is, that they should specify the numbers of both sexes dying of every distemper in every month, and at every age. See the end of the 4th

essay in Dr Price's *Treatise on Reverfionary Payments*. Mortality. Registers of mortality thus improved, when compared with records of the seasons, and with the circumstances that discriminate different situations, might contribute greatly to the increase of medical knowledge; and they would afford the necessary data for determining the difference between the duration of human life among males and females; for such a difference there certainly is much in favour of females, as will appear from the following facts.

At Northampton, though more males are born than females, and nearly the same number die; yet the number of living females appeared, by an account taken in 1746, to be greater than the number of males, in the proportion of 2301 to 1770, or 39 to 30.

At Berlin it appeared, from an accurate account which was taken of the inhabitants in 1747, that the number of female citizens exceeded the number of male citizens in the proportion of 459 to 391. And yet out of this smaller number of males, more had died for 20 years preceding 1751, in the proportion of 19 to 17.

At Edinburgh, in 1743, the number of females was to the number of males as 4 to 3. (See Maitland's *History of Edinburgh*, p. 220.) But the females that died annually from 1749 to 1758, were to the males in no higher proportion than $3\frac{1}{2}$ to 3.

He that will take the pains to examine the accounts in *Phil. Trans.* abr. vol. vii. part iv. p. 46, &c. will find, that though in the towns there enumerated, the proportion of males and females born is no higher than 19 to 18, yet the proportion of boys and girls that die is 8 to 7; and that, in particular, the still-born and chrysom males are to the still-born and chrysom females as 3 to 2.

In 39 parishes of the district of Vaud in Switzerland, the number of males that died during ten years before 1766 was 8170; of females 8167; of whom the numbers that died under one year of age were 1817 males and 1305 females; and under ten years of age, 3099 males and 2598 females. In the beginning of life, therefore, and before any emigrations can take place, the rate of mortality among males appears to be greater than among females. And this is rendered yet more certain by the following accounts. At Vevey, in the district of Vaud just mentioned, there died in the course of 20 years, ended at 1764, in the first month after birth, of males 135 to 89 females; and in the first year 225 to 162. To the same effect it appears from a table given by Sufmilch, in his *Gottliche Ordnung*, vol. ii. p. 317, that in Berlin 203 males die in the first month, and but 168 females; and in the first year, 489 to 395; and also, from a table of Struycks, that in Holland 396 males die in the first year to 306 females.

The authorities for the facts here mentioned, and much more on this subject, may be found in the 4th essay in Dr Price's *Treatise on Reverfionary Payments*, and in the supplement at the end of that treatise.

We shall here only add the following table, taken from a memoir of Mr Wargentin's, published in the collection of the *Memoirs of the Royal Academy of Sciences at Stockholm*, printed at Paris in 1772.

Mortality. In all Sweden for nine years, ended in 1763, the proportion of females to males that died out of a given number living, was

Under the age of one year	—	1000 to 1099
From 1 to 3 years of age	—	1000 1022
3 5	—	1042
5 10	—	1074
10 15	—	1080
15 20	—	1097
20 25	—	1283
25 30	—	1161
30 35	—	993
35 40	—	1159
40 45	—	1115
45 50	—	1340
50 55	—	1339
55 60	—	1292
60 65	—	1115
65 70	—	1080
70 80	—	1022
80 90	—	1046
Above 90	—	1044

Registers of mortality on the improved plan before mentioned, were established in 1772 at Chester, and also in 1773 at Warrington in Lancashire; and they are so comprehensive and correct, that there is reason to expect they will afford much instruction on the subject of human mortality, and the values of lives.

But the country most distinguished in this respect is Sweden: for in that kingdom exact accounts are taken of the births, marriages, and burials, and of the numbers of both sexes that die at all ages in every town and district, and also at the end of every period of five years, of the numbers living at every age: and at Stockholm a society is established, whose business it is to superintend and regulate the enumerations, and to collect from the different parts of the kingdom the registers, in order to digest them into tables of observation. These regulations were begun in Sweden in 1755; and tables, containing the result of them from 1755 to 1763, have been published in Mr Wargentin's memoir just referred to; and the most material parts of them may be found in an essay by Dr Price on the Difference between the Duration of Human Life in Towns and in Country Parishes, printed in the 65th volume of the Philosoph. Trans. part ii.

In the fourth essay in Dr Price's Treatise on Reversionary Payments and Life-Annuities, the following account is given of the principles on which tables of observation are formed from registers of mortality; and of the proper method of forming them, so as to render them just representations of the number of inhabitants, and the probabilities of the duration of human life in a town or country.

In every place which just supports itself in the number of its inhabitants, without any recruits from other places; or where, for a course of years, there has been no increase or decrease; the number of persons dying every year at any particular age, and above it, must be equal to the number of the living at that age. The number, for example, dying every year at all ages from the beginning to the utmost extremity of life, must, in such a situation, be just equal to the

whole number born every year. And for the same reason, the number dying every year at one year of age and upwards, at two years of age and upwards, at three and upwards, and so on, must be equal to the numbers that attain to those ages every year; or, which is the same, to the numbers of the living at those ages. It is obvious, that unless this happens, the number of inhabitants cannot remain the same. If the former number is greater than the latter, the inhabitants must decrease; if less, they must increase. From this observation it follows, that in a town or country where there is no increase or decrease, bills of mortality which give the ages at which all die, will show the exact number of inhabitants, and also the exact law according to which human life wastes in that town or country.

In order to find the number of inhabitants, the mean numbers dying annually at every particular age and upwards must be taken as given by the bills, and placed under one another in the order of the second column of the following tables. These numbers will, it has appeared, be the numbers of the living at 1, 2, 3, &c. years of age; and consequently the sum diminished by half the number born annually will be the whole number of inhabitants.

This subtraction is necessary for the following reason. In a table formed in the manner here directed, it is supposed that the numbers in the second column are all living together at the beginning of every year. Thus the number in the second column opposite to 0 in the first column, the table supposes to be all just born together on the first day of the year. The number, likewise, opposite to 1, it supposes to attain to one year of age just at the same time that the former number is born. And the like is true of every number in the second column. During the course of the year, as many will die at all ages as were born at the beginning of the year; and consequently, there will be an excess of the number alive at the beginning of the year above the number alive at the end of the year, equal to the whole number of the annual births; and the true number constantly alive together, is the arithmetical mean between these two numbers; or agreeably to the rule here given, the sum of the numbers in the second column of the table lessened by half the number of annual births.

In such a series of numbers, the excess of each number above that which immediately follows it will be the number dying every year out of the particular number alive at the beginning of the year; and these excesses set down regularly as in the third column of the table to which we have referred, will show the different rates at which human life wastes through all its different periods, and the different probabilities of life at all particular ages.

It must be remembered, that what has been now said goes on the supposition, that the place whose bills of mortality are given, supports itself, by procreation only, in the number of its inhabitants. In towns this very seldom happens on account of the luxury and debauchery which generally prevail in them. They are, therefore, commonly kept up by a constant accession of strangers, who remove to them from country parishes and villages. In these circumstances, in order to find the true number of inhabitants, and probabilities

Mortality. babilities of life, from bills of mortality containing an account of the ages at which all die, it is necessary that the proportion of the annual births to the annual settlers should be known, and also the period of life at which the latter remove. Both these particulars may be discovered in the following method.

If for a course of years there has been no sensible increase or decrease in a place, the number of annual settlers will be equal to the excess of the annual burials above the annual births. If there is an increase, it will be greater than this excess. If there is a decrease, it will be less.

The period of life at which these settlers remove, will appear in the bills by an increase in the number of deaths at that period and beyond it. Thus in the London bills the number of deaths between 20 and 30 is generally above double; and between 30 and 40 near triple the number of deaths between 10 and 20; and the true account of this is, that from the age of 18 or 20 to 35 or 50, there is an afflux of people every year to London from the country, which occasions a great increase in the number of inhabitants at these ages; and consequently raises the deaths for all ages above 20 considerably above their due proportion, when compared with the number of deaths before 20. This is observable in all the bills of mortality for towns with which we are acquainted, not excepting even the Breslaw bills. Dr Halley takes notice, that these bills gave the number of deaths between 10 and 20 too small. This he considered as an irregularity in them owing to chance; and, therefore, in forming his table of observations, he took the liberty so far to correct it, as to render the proportion of those who die to the living in this division of life nearly the same with the proportion which, he says, he had been informed die annually of the young lads in Christ-Church Hospital. But the truth is, that this irregularity in the bills was derived from the cause we have just assigned. During the five years for which the Breslaw bills are given by Dr Halley, the births did indeed a little exceed the burials; but it appears that this was the effect of some peculiar causes that happened to operate just at that time; for during a complete century from 1633 to 1734, the annual medium of births was 1089, and of burials 1256. This town, therefore, must have been all along kept up by a number of yearly recruits from other places, equal to about a seventh part of the yearly births.

It appears from the account in the Philosophical Transactions (Abridgment, vol. vii. n^o 380, p. 46, &c.), that from 1717 to 1725, the annual medium of births at Breslaw was 1252, of burials 1507; and also that much the greatest part of the births died under 10 years of age. From a table in Süssmilch's works, vol. i. p. 38. it appears that in reality the greater part of all that die in this town are children under five years of age.

What has been now observed concerning the period of life at which people remove from the country to settle in towns, would appear sufficiently probable were there no such evidence for it as has been mentioned; for it might be well reckoned that these people in general must be single persons in the beginning of mature life, who, not having yet obtained

settlements in the places where they were born, migrate to towns in quest of employments. **Mortality.**

Having premised these observations, it will be proper next to endeavour to explain distinctly the effect which these accessions to towns must have on tables of observation formed from their bills of mortality. This is a subject proper to be insisted on, because mistakes have been committed about it; and because also the discussion of it is necessary to show how near to truth the values of lives come as deduced from such tables.

The following general rule may be given on this subject. If a place has for a course of years been maintained in a state nearly stationary, as to number of inhabitants, by recruits coming in every year, to prevent the decrease that would arise from the excess of burials above the births, a table formed on the principle, "that the number dying annually after every particular age, is equal to the number living at that age," will give the number of inhabitants, and the probabilities of life, too great, for all ages preceding that at which the recruits cease; and after this it will give them right. If the accessions are so great as to cause an increase in the place, such a table will give the number of inhabitants and the probabilities of life too little after the age at which the accessions cease; and too great if there is a decrease. Before that age it will in both cases give them too great; but most considerably so in the former case, or when there is an increase.

Agreeably to these observations, if a place increases not in consequence of accessions from other places, but of a constant excess of the births above the deaths, a table constructed on the principle that has been mentioned will give the probabilities of life too low through the whole extent of life; because in such circumstances the number of deaths in the first stages of life must be too great, in comparison of the number of deaths in the latter stages; and more or less so as the increase is more or less rapid. The contrary in all respects takes place where there is a decrease arising from the excess of the deaths above the births.

For example: Let us suppose that 244 of those born in a town attain annually to 20 years of age, and that 250 more, all likewise 20 years of age, come into it annually from other places, in consequence of which it has for a course of years been just maintained in the number of its inhabitants, without any sensible increase or decrease: in these circumstances, the number of the living in the town of the age of 20 will be always 244 natives and 250 settlers, or 494 in all; and since these are supposed all to die in the town, and no more recruits are supposed to come in, 494 will be likewise the number dying annually at 20 and upwards. In the same manner it will appear, on these suppositions, that the number of the living, at every age subsequent to 20, will be equal to the number dying annually at that age and above it; and consequently, that the number of inhabitants and the decrements of life, for every such age, will be given exactly by the table. But for all ages before 20, they will be given much too great. For let 280 of all born in the town reach 10; in this case, 280 will be the true number of the living in the town at the age of 10; and the recruits not coming in till 20, the number given

Mortality given by the bills as dying between 10 and 20 will be the true number dying annually of the living in this division of life. Let this number be 36; and it will follow that the table ought to make the numbers of the living at the ages between 10 and 20, a series of decreasing means between 280 and (280 diminished by 36, or) 244. But in forming the table on the principle just mentioned, 250 (the number above 20 dying annually in the town who were not born in it) will be added to each number in this series; and therefore the table will give the numbers of the living, and the probabilities of life in this division of life, almost twice as great as they really are. This observation, it is manifest, may be applied to all the ages under 20.

It is necessary to add, that such a table will give the number of inhabitants and the probabilities of life equally wrong before 20, whether the recruits all come in at 20, agreeably to the supposition just made, or only begin then to come in. In this last case, the table will give the number of inhabitants and probabilities of life too great throughout the whole extent of life, if the recruits come in at all ages above 20. But if they cease at any particular age, it will give them right only from that age; and before, it will err all along on the side of excess; but less considerably between 20 and that age than before 20. For example: if, of the 250 supposed to come in at 20, only 150 then come in, and the rest at 30; the number of the living will be given 100 too high at every age between 20 and 30; but, as just shown, they will be given 250 too high at every age before 20. In general, therefore, the number of the living at any particular age must be given by the supposed table as many too great as there are annual settlers after that age; and if these settlers come in at all ages indiscriminately, during any certain interval of life, the number of inhabitants and the probabilities of life will be continually growing less and less wrong the nearer any age is to the end of that interval. These observations prove, that tables of observation formed in the common way, from bills of mortality for places where there is an excess of the burials above the births, must be erroneous for a great part of the duration of life, in proportion to the degree of that excess. They show likewise at what parts of life the errors in such tables are most considerable, and how they may be in a great measure corrected.

All this shall be exemplified in the particular case of London.

The number of deaths between the ages of 10 and 20 is always so small in the London bills, that it seems certain few recruits come to London under 20, or at least not so many as before this age are sent out for education to schools and universities. After 20 great numbers come in till 30, and some perhaps till 40 or 50: but at every age after 50, it is probable that more retire from London than come to it. The London tables of observation, therefore, being formed on the principle already mentioned, cannot give the probabilities of life right till 40. Between 30 and 40 they must be a little too high; but more so between 20 and 30, and most of all so before 20. It follows also, that these tables must give the number of inhabitants in London much too great.

No 219.

The first of the following tables is formed in the manner here explained, from the London bills for 10 years, from 1759 to 1768, and adapted to 1000 born as a radix. The sum of the numbers in the second column, diminished by half the number born, is 25,757. According to this table then, for every 1000 deaths in London there are $25\frac{3}{4}$ as many inhabitants; or, in other words, the expectation of a child just born is $25\frac{3}{4}$; and the inhabitants are to the annual burials as $25\frac{3}{4}$ to 1. But it has appeared, that the numbers in the second column, being given on the supposition that all those who die in London were born there, must be too great; and we have from hence a demonstration, that the probabilities of life are given in the common tables of London observations too high for at least the first 30 years of life; and also, that the number of inhabitants in London must be less than $25\frac{3}{4}$ multiplied by the annual burials. The common tables, therefore, of London observations undoubtedly need correction, as Mr Simpson suggested, and in some measure performed; though too imperfectly, and without going upon any fixed principles, or showing particularly how tables of observation ought to be formed, and how far in different circumstances, and at different ages, they are to be depended on. The way of doing this, and in general the right method of forming genuine tables of observation for towns, may be learned from the following rule:

“From the sum of all that die annually, after any given age, subtract the number of annual settlers after that age; and the remainder will be the number of the living at the given time.”

This rule can want no explication or proof after what has been already said.

If, therefore, the number of annual settlers in a town at every age could be ascertained, a perfect table of observations might be formed for that town from bills of mortality, containing an account of the ages at which all die in it. But no more can be learned in this instance, from any bills, than the whole number of annual settlers, and the general division of life in which they enter. This, however, may be sufficient to enable us to form tables that shall be tolerably exact. For instance: Suppose the annual deaths in a town which has not increased or decreased, to have been for many years in the proportion of 4 to 3 to the annual births. It will hence follow, that $\frac{1}{4}$ of the persons who die in such a town are settlers, or emigrants from other places, and not natives; and the sudden increase in the deaths after 20 will also show, agreeably to what was before observed, that they enter after this age. In forming, therefore, a table for such a town, a quarter of all that die at all ages throughout the whole extent of life must be deducted from the sum of all that die after every given age before 20; and the remainder will be the true number living at that given age. And if at 20, and every age above it, this deduction is omitted, or the number of the living at every such age is taken the same with the sum of all that die after it, the result will be (supposing most of the settlers to come in before 30, and all before 40) a table exact till 20; too high between 20 and 30; but nearly right for some years before 40; and after 40 exact again. Such a table.

Mortality. table, it is evident, will be the same with the table last described at all ages above 20, and different from it only under 20. It is evident also, that on account of its giving the probabilities of life too great for some years after 20, the number of inhabitants deduced from it may be depended on as somewhat greater than the truth; and more or less so, as the annual recruits enter in general later or sooner after 20.

Let us now consider what the result of these remarks will be, when applied particularly to the London bills.

It must be here first observed, that at least one quarter of all that die in London are supplies or settlers from the country, and not natives. The medium of annual burials for 10 years, from 1759 to 1768, was 22,956; of births 15,710. The excess is 7246, or near a third of the burials. The same excess during 10 years before 1750 was 10,500, or near half the burials. London was then decreasing. For the last 12 or 15 years it has been increasing. This excess, therefore, agreeably to the foregoing observations, was then greater than the number of annual settlers, and it is now less. It is however here supposed, that the number of annual settlers is now no more than a quarter of the annual burials, in order to allow for more omissions in the births than the burials; and also, in order to be more sure of obtaining results that shall not exceed the truth.

Of every 1000 then who die in London only 750 are natives, and 250 are recruits who come to it after 18 or 20 years of age; and, consequently, in order to obtain from the bills a more correct table than the first of the following tables, 250 must be subtracted from every one of the numbers in the second column till 20; and the numbers in the third column must be kept the same, the bills always giving these right. After 20, the table is to be continued unaltered; and the result will be, a table which will give the numbers of the living at all ages in London much nearer the truth, but still somewhat too high. Such is the second of the following tables. The sum of all the numbers in the second column of this table, diminished by 500, is 20,750. For every 1000 deaths, therefore, in London, there are, according to this table, 20,750 living persons in it; or for every single death $20\frac{3}{4}$ inhabitants. It was before shown, that the number of inhabitants in London could not be so great as 25 times $\frac{1}{4}$ the deaths. It now appears (since the numbers in the second column of this table are too high) that the number of inhabitants in London cannot be so great as even 20 times $\frac{1}{4}$ the deaths. And this is a conclusion which every one who will bestow due attention on what has been said, will find himself forced to receive. It will not be amiss, however, to confirm it by the following fact, the knowledge of which

is derived from the particular enquiry and information of Mr Harris, the late ingenious master of the royal mathematical school in Christ-Church hospital. The average of lads in this school has, for 30 years past, been 831. They are admitted at all ages between 7 and 11; and few stay beyond 16: they are therefore in general, lads between the ages of 8 and 16. They have better accommodations than it can be supposed children commonly have; and about 300 of them have the particular advantage of being educated in the country. In such circumstances, it may be well reckoned, that the proportion of children dying annually must be less than the general proportion of children dying annually at the same ages in London. The fact is, that for the last 30 years $11\frac{1}{2}$ have died annually, or one in 70 $\frac{2}{3}$.

According to Table II. one in 73 dies between 10 and 20, and one in 70 between 8 and 16. That table, therefore, probably gives the decrements of life in London, at these ages, too little, and the numbers of the living too great: and if this is true of these ages, it must be true of all other ages under 20; and it follows demonstrably, in conformity to what was before shown, that more people settle in London after 20 than the fourth above supposed; and that from 20 to at least 30 or 35, the numbers of the living are given too great, in proportion to the decrements of life.

In this table the numbers in the second column are doubled at 20, agreeably to what really happens in London; and the sum of the numbers in this column diminished by half the whole number of deaths, gives the expectation of life, not of a child just born, as in other tables, but of all the inhabitants of London at the time they enter it, whether that be at birth or at 20 years of age. The *expectations*, therefore, and the *values* of London lives under 20, cannot be calculated from this table. But it may be very easily fitted for this purpose, by finding the number of births which, according to the given decrements of life, will leave 494 alive at 20; and then adapting the intermediate numbers in such a manner to this radix, as to preserve all along the number of the living in the same proportion to the numbers of the dead. This is done in the third of the following tables; and this table may be recommended as better adapted to the present state of London than any other table. The values of lives, however, deduced from it, are in general nearly the same with those deduced by Mr Simpson from the London bills as they stood forty years ago; the main difference is, that after 52, and in old age, this table gives them somewhat lower than Mr Simpson's table. The fourth and fifth of the following tables, compared with the two last, will give a distinct and full view of the difference between the rate of human mortality in great towns and in country parishes and villages.

TABLE I.

Showing the probabilities of life in London, on the supposition that all who die in London were born there. Formed from the bills for 10 years, from 1759 to 1768.

Ages.	Persons living.	Decr. of Life.	Ages.	Persons living.	Decr. of Life.	Ages.	Persons living.	Decr. of Life.
0	1000	240	31	404	9	62	132	7
1	760	99	32	395	9	63	125	7
2	661	42	33	386	9	64	118	7
3	619	29	34	377	9	65	111	7
4	590	21	35	368	9	66	104	7
5	569	11	36	359	9	67	97	7
6	558	10	37	350	9	68	90	7
7	548	7	38	341	9	69	83	7
8	541	6	39	332	10	70	76	6
9	535	5	40	322	10	71	70	6
10	530	4	41	312	10	72	64	6
11	526	4	42	302	10	73	58	5
12	522	4	43	292	10	74	53	5
13	518	3	44	282	10	75	48	5
14	515	3	45	272	10	76	43	5
15	512	3	46	262	10	77	38	5
16	509	3	47	252	10	78	33	4
17	506	3	48	242	9	79	29	4
18	503	4	49	233	9	80	25	3
19	499	5	50	224	9	81	22	3
20	494	7	51	215	9	82	19	3
21	487	8	52	206	8	83	16	3
22	479	8	53	198	8	84	13	2
23	471	8	54	190	7	85	11	2
24	463	8	55	183	7	86	9	2
25	455	8	56	176	7	87	7	2
26	447	8	57	169	7	88	5	1
27	439	8	58	162	7	89	4	1
28	431	9	59	155	8	90	3	1
29	422	9	60	147	8			
30	413	9	61	139	7			

TABLE III.

Showing the true probabilities of life in London for all ages. Formed from the bills for 10 years, from 1759 to 1768.

Ages.	Persons living.	Decr. of Life.	Ages.	Persons living.	Decr. of Life.	Ages.	Persons living.	Decr. of Life.
0	1518	486	31	404	9	62	132	7
1	1032	200	32	395	9	63	125	7
2	832	85	33	386	9	64	118	7
3	747	59	34	377	9	65	111	7
4	688	42	35	368	9	66	104	7
5	646	23	36	359	9	67	97	7
6	623	20	37	350	9	68	90	7
7	603	14	38	341	9	69	83	7
8	589	12	39	332	10	70	76	6
9	577	10	40	322	10	71	70	6
10	567	9	41	312	10	72	64	6
11	558	9	42	302	10	73	58	5
12	549	8	43	292	10	74	53	5
13	541	7	44	282	10	75	48	5
14	534	6	45	272	10	76	43	5
15	528	6	46	262	10	77	38	5
16	522	7	47	252	10	78	33	4
17	515	7	48	242	9	79	29	4
18	508	7	49	233	9	80	25	3
19	501	7	50	224	9	81	22	3
20	494	7	51	215	9	82	19	3
21	487	8	52	206	8	83	16	3
22	479	8	53	198	8	84	13	2
23	471	8	54	190	7	85	11	2
24	463	8	55	183	7	86	9	2
25	455	8	56	176	7	87	7	2
26	447	8	57	169	7	88	5	1
27	439	8	58	162	7	89	4	1
28	431	9	59	155	8	90	3	1
29	422	9	60	147	8			
30	413	9	61	139	7			

TABLE II.

Showing the true probabilities of life in London till the age of 19.

Ages.	Persons living.	Decr. of Life.	Ages.	Persons living.	Decr. of Life.
0	750	240	12	272	4
1	510	99	13	268	3
2	411	42	14	265	3
3	369	29	15	262	3
4	340	21	16	259	3
5	319	11	17	256	3
6	308	10	18	253	4
7	298	7	19	249	
8	291	6	20	494	
9	285	5	21	487	
10	280	4	&c.	&c.	
11	276	4			

The numbers in the second column to be continued as in the last table.

All the bills, from which the following tables are formed, give the numbers dying under 1 as well as under 2 years; and in the numbers dying under 1 are included, in the country parish in Brandenburg and at Berlin, all the still-borns. All the bills also give the numbers dying in every period of five years.

T A B L E IV.

Showing the Probabilities of Life in the District of Vaud, Switzerland, formed from the Registers of 43 Parishes, given by Mr Muret, in the First Part of the Bern Memoirs for the Year 1766.

Age.	Living.	Decr.	Age.	Living.	Decr.	Age.	Living.	Decr.
0	1000	189	31	558	5	62	286	12
1	811	46	32	553	5	63	274	12
2	765	30	33	548	4	64	262	12
3	735	20	34	544	5			
4	715	14				65	250	14
			35	539	6	66	236	16
5	701	13	36	533	6	67	220	18
6	688	11	37	527	7	68	202	18
7	677	10	38	520	7	69	184	16
8	667	8	39	513	7			
9	659	6				70	168	15
			40	506	6	71	153	13
10	653	5	41	500	6	72	140	11
11	648	5	42	494	6	73	129	10
12	643	4	43	488	6	74	119	10
13	639	4	44	482	6			
14	635	4				75	109	11
			45	476	7	76	98	13
15	631	5	46	469	8	77	85	14
16	626	4	47	461	10	78	71	13
17	622	4	48	451	10	79	58	12
18	618	4	49	441	10			
19	614	4				80	46	10
			50	431	9	81	36	7
20	610	4	51	422	8	82	29	5
21	606	4	52	414	8	83	24	4
22	602	5	53	406	9	84	20	3
23	597	5	54	397	9			
24	592	5				85	17	3
			55	388	11	86	14	3
25	587	5	56	377	13	87	11	2
26	582	5	57	364	16	88	9	2
27	577	5	58	348	17	89	7	2
28	572	5	59	331	17			
29	567	4				90	5	1
			60	314	15			
30	563	5	61	299	13			

T A B L E V.

Showing the Probabilities of Life in a Country Parish in Brandenburg, formed from the Bills for 50 Years, from 1710 to 1759, as given by Mr Sufmilch, in his Gottliche Ordnung.

Age.	Living.	Decr.	Age.	Living.	Decr.	Age.	Living.	Decr.
0	1000	225	31	482	5	62	260	12
1	775	57	32	477	5	63	248	12
2	718	31	33	472	5	64	236	12
3	687	23	34	467	5			
4	664	22				65	224	11
			35	462	6	66	213	11
5	642	20	36	456	6	67	202	12
6	622	15	37	450	6	68	190	12
7	607	12	38	444	6	69	178	12
8	595	10	39	438	6			
9	585	8				70	166	13
			40	432	5	71	153	15
10	577	7	41	427	5	72	138	16
11	570	6	42	422	5	73	122	15
12	564	5	43	417	5	74	107	14
13	559	5	44	412	6			
14	554	5				75	93	13
			45	407	6	76	80	12
15	549	5	46	400	6	77	68	9
16	544	5	47	394	6	78	59	8
17	539	4	48	388	7	79	51	7
18	535	4	49	381	7			
19	531	4				80	44	6
			50	374	7	81	38	6
20	527	5	51	367	8	82	32	6
21	522	5	52	359	8	83	25	6
22	517	5	53	351	8	84	21	5
23	512	5	54	343	9			
24	507	5				85	15	4
			55	334	10	86	11	3
25	502	4	56	324	10	87	8	2
26	498	3	57	314	10	88	6	2
27	495	3	58	304	11	89	4	1
28	492	3	59	293	11			
29	489	3				90	3	1
			60	282	11	91	2	1
30	486	4	61	271	11	92	1	1

T A B L E VI.

Showing the Probabilities of Life at Vienna, formed from the Bills for Eight years, as given by Mr Sufmilch, in his Gottliche Ordnung, page 32, Tables.

Age.	Living.	Decr.	Age.	Living.	Decr.	Age.	Living.	Decr.
0	1495	682	31	364	6	62	129	6
1	813	107	32	358	5	63	123	7
2	706	61	33	353	6	64	116	7
3	645	46	34	347	7			
4	599	33				65	109	8
			35	340	8	66	101	8
5	566	30	36	332	8	67	93	8
6	536	20	37	324	8	68	85	7
7	516	11	38	316	9	69	78	7
8	505	9	39	307	9			
9	496	7				70	71	6
			40	298	8	71	65	5
10	489	6	41	290	7	72	60	5
11	483	5	42	283	6	73	55	4
12	478	5	43	277	6	74	51	4
13	473	6	44	271	7			
14	467	6				75	47	5
			45	264	8	76	42	5
15	461	6	46	256	9	77	37	5
16	455	7	47	247	9	78	32	5
17	448	6	48	238	9	79	27	4
18	442	6	49	229	9			
19	436	6				80	23	3
			50	220	8	81	20	2
20	430	5	51	212	7	82	19	2
21	425	5	52	205	7	83	16	2
22	420	5	53	198	7	84	14	2
23	415	6	54	191	7			
24	409	6				85	12	2
			55	184	8	86	10	2
25	403	6	56	176	8	87	8	2
26	397	6	57	168	9	88	6	2
27	391	7	58	159	8	89	4	1
28	381	7	59	151	8			
29	377	7				90	3	1
			60	143	7	91	2	1
30	370	6	61	136	7	92	1	1

T A B L E VII.

Showing the Probabilities of Life at Berlin, formed from the Bills for Four Years, from 1752 to 1755, given by Mr Sufmilch in his Gottliche Ordnung, vol. ii. page 37, Tables.

Age.	Living.	Decr.	Age.	Living.	Decr.	Age.	Living.	Decr.
0	1427	524	33	361	7	65	112	6
1	903	151	34	354	7	66	106	7
2	752	61				67	99	7
3	691	73	35	347	8	68	92	6
4	618	45	36	339	9	69	86	6
			37	330	10			
5	573	21	38	320	10	70	80	6
6	552	15	39	310	10	71	74	6
7	536	13				72	68	6
8	523	9	40	300	10	73	62	5
9	514	7	41	290	9	74	57	5
			42	281	8			
10	507	5	43	274	7	75	52	5
11	502	4	44	266	7	76	47	5
12	498	4				77	42	5
13	494	4	45	259	7	78	37	5
14	490	4	46	252	7	79	32	4
			47	245	7			
15	486	4	48	238	7	80	28	4
16	482	5	49	231	7	81	24	3
17	477	5				82	21	2
18	472	5	50	224	7	83	19	2
19	467	6	51	217	7	84	17	2
			52	210	7			
20	461	6	53	203	8	85	15	2
21	455	6	54	195	8	86	13	2
22	449	6				87	11	2
23	443	7	55	187	8	88	9	2
24	436	8	56	179	8	89	7	1
			57	171	8			
25	428	9	58	163	9	90	6	1
26	421	9	59	154	9	91	5	1
27	412	9				92	4	1
28	403	9	60	145	8	93	3	1
29	394	9	61	137	7	94	2	1
			62	130	6			
30	385	9	63	124	6			
31	376	8	64	118	6			
32	368	7						

BRIEF of MORTANCESTRY, in Scots law; anciently the ground of an action at the instance of an heir, in the special case where he had been excluded from the possession of his ancestor's estate by the superior, or other person pretending right.

MORTAR, a preparation of lime and sand mixed with water, which serves as a cement, and is used by masons and bricklayers in building walls of stone and brick.

Under the article **CEMENT**, we have already given the theory of mortar, as delivered by Mr Anderson; which has now received a farther confirmation by a recent discovery, that if the lime is flaked, and the mortar made up, with lime-water instead of common

water, the mortar will be much better. The reason of this is, that in common water, especially such as is drawn from wells, there is always a considerable quantity of fixed air, which, mingling with the mortar previous to its being used, spoils it by reducing the quicklime in part to an inert calcareous earth like chalk; but when it is built up in a perfectly caustic state, it attracts the air so slowly, that it hardens into a kind of stony matter as hard as was the rock from whence the limestone was taken.

MORTAR, a chemical utensil very useful for the division of bodies, partly by percussion and partly by grinding. Mortars have the form of an inverted bell. The matter intended to be pounded is to be put into them,

Mortar.

them, and there it is to be struck and bruised by a long instrument called a *pestle*. The motion given to the pestle ought to vary according to the nature of the substances to be pounded. Those which are easily broken, or which are apt to fly out of the mortar, or which are hardened by the stroke of the pestle, require that this instrument should be moved circularly, rather by grinding or bruising than by striking. Those substances which are softened by the heat occasioned by rubbing and percussion, require to be pounded very slowly. Lastly, those which are very hard, and which are not capable of being softened, are easily pounded by repeated strokes of the pestle. They require no bruising but when they are brought to a certain degree of fineness. But these things are better learned by habit and practice than by any directions.

As mortars are instruments which are constantly used in chemistry, they ought to be kept of all sizes and materials; as of marble, copper, glass, iron, griststone, and agate. The nature of the substance to be pounded determines the choice of the kind of mortar. The hardness and dissolving power of that substance are particularly to be attended to. As copper is a soft metal, soluble by almost all menstruums, and hurtful to health, good artists have some time ago proscribed the use of this metal.

One of the principal inconveniences of pulverisation in a mortar proceeds from the fine powder which rises abundantly from some substances during the operation. If these substances be precious, the loss will be considerable; and if they be injurious to health, they may hurt the operator. These inconveniences may be remedied, either by covering the mortar with a skin, in the middle of which is a hole, through which

the pestle passes; or by moistening the matter with a little water when this addition does not injure it; or, lastly, by covering the mouth and nose of the operator with a fine cloth, to exclude this powder. Some substances, as corrosive sublimate, arsenic, calxes of lead, cantharides, euphorbium, &c. are so noxious, that all these precautions ought to be used, particularly when a large quantity of them is pounded.

Large mortars ought to be fixed upon a block of wood, so high, that the mortar shall be level with the middle of the operator. When the pestle is large and heavy, it ought to be suspended by a cord or chain fixed to a moveable pole, placed horizontally above the mortar: this pole considerably relieves the operator, because its elasticity assists the raising of the pestle.

MORTAR-PIECE, in the military art, a short piece of ordnance, thick and wide, proper for throwing bombs, carcasses, shells, stones, bags filled with grape-shot, &c. See GUNNERY, n° 50.

Land MORTARS, are those used in sieges, and of late in battles, mounted on beds made of solid timber, consisting generally of four pieces, those of the royal and cohorn excepted, which are but one single block; and both mortar and bed are transported on block-carriages. There is likewise a kind of land-mortars, mounted on travelling carriages, invented by count Buckeburg, which may be elevated to any degree; whereas ours are fixed to an angle of 45 degrees, and firmly lashed with ropes. The following table shows the weight of land-mortars and shells; together with the quantity of powder the chambers hold when full; the weight of the shells, and powder for loading them.

Diameter of mortars.	13-inch.	10-inch.	8-inch.	5.8-inch royal.	4.6-inch cohorn.
Mortar's weight.	C. qr. lb. 25 0 0	C. qr. lb. 10 2 18	C. qr. lb. 4 0 20	C. qr. lb. 1 1 0	C. qr. lb. 0 3 0
Shell's weight.	1 2 15	0 2 25	0 1 15	0 0 12	0 0 7
Shell's cont. of powder.	lb. oz. gr. 9 4 8	lb. oz. gr. 4 14 12	lb. oz. gr. 2 3 8	lb. oz. gr. 1 1 8	lb. oz. gr. 0 8 0
Chamber's cont. of powder.	9 1 8	4 0 0	2 0 10	1 0 0	0 8 0

Sea MORTARS, are those which are fixed in the bomb-vessels for bombarding places by sea: and as they are generally fired at a much greater distance than that which is required by land, they are made

somewhat longer and much heavier than the land-mortars. The following table exhibits the weight of the sea-mortars and shells, and also of their full charges.

Nature of the mortar.	Powder contained in the chamber when full.	Weight of the mortar.	Weight of the shell when fixed.	Weight of powder contained in the shell.
	lb. oz.	C. qr. lb.	lb.	lb. oz.
10-inch howitzer.	12 0	31 2 26		
13-inch mortar.	30 0	81 2 1	198	7 0
10-inch mortar.	12 0	34 2 11	93	

Mortar.

To Charge or Load a MORTAR, the proper quantity of gunpowder is put into the chamber, and if there be any vacant space they fill it up with hay; some choose a wooden plug; over this they lay a turf, some a wooden tampion fitted to the bore of the piece; and lastly the bomb; taking care that the fuse be in the axis thereof, and the orifice be turned from the muzzle of the piece: what space remains is to be filled up with hay, straw, turf, &c. so as the load may not be exploded without the utmost violence.

The quantity of gunpowder to be used is found by dividing the weight of the bomb by 30; though this rule is not always to be strictly observed.

When the proper quantity of powder necessary to charge a sea-mortar is put into the chamber, it is covered with a wad well beat down with the rammer. After this the fixed shell is placed upon the wad, as near the middle of the mortar as possible, with the fuse-hole uppermost, and another wad pressed down close upon it, so as to keep the shell firm in its position. The officer then points the mortar according to the proposed inclination.—When the mortar is thus fixed, the fuse is opened; the priming-iron is also thrust into the touch-hole of the mortar to clear it, after which it is primed with the finest powder. This done, two of the matrosses or sailors, taking each one of the matches, the first lights the fuse, and the other fires the mortar. The bomb, thrown out by the explosion of the powder, is carried to the place intended: and the fuse, which ought to be exhausted at the instant of the shell's falling, inflames the powder contained in it, and bursts the shell in splinters; which, flying off circularly, occasion incredible mischief where-soever they reach.

If the service of mortars should render it necessary to use pound-shots, 200 of them with a wooden bottom are to be put into the 13 inch mortar, and a quantity of powder not exceeding 5 pounds; and 100 of the above shot with $2\frac{1}{2}$ pounds of powder, for the 10 inch mortar, or three pounds at most.

To Elevate the MORTAR so as its axis may make any given angle with the horizon, they apply the artillery-level or gunner's quadrant. An elevation of 70 or 80 degrees is what is commonly chosen for rendering mortars most serviceable in casting shells into towns, forts, &c. though the greatest range be at 45 degrees.

All the English mortars are fixed to an angle of 45 degrees, and lashed strongly with ropes at that elevation. Although in a siege there is only one case in which shells should be thrown with an angle of 45 degrees; that is, when the battery is so far off that they cannot otherwise reach the works: for when shells are thrown out of the trenches into the works of a fortification, or from the town into the trenches, they should have as little elevation as possible, in order to roll along, and not bury themselves; whereby the da-

mage they do, and the terror they occasion, are much greater than if they sink into the ground. On the contrary, when shells are thrown upon magazines or any other buildings with an intention to destroy them, the mortars should be elevated as high as possible, that the shells may acquire a greater force in their fall, and consequently do greater execution.

If all mortar pieces were, as they ought to be, exactly similar, and their requisites of powder as the cubes of the diameters of their several bores, and if their shells, bombs, carcases, &c. were also similar; then, comparing like with like, their ranges on the plane of the horizon, under the same degree of elevation, would be equal; and consequently one piece being well proved, *i. e.* the range of the grenado, bomb, carcase, &c. being found to any degree of elevation, the whole work of the mortar-piece would become very easy and exact.

But since mortars are not thus similar, it is required, that the range of the piece, at some known degree of elevation, be accurately found by measuring; and from hence all the other ranges may be determined.

Thus, to find the range of the piece at any other elevation required; say, As the sine of double the angle under which the experiment was made, is to the sine of double the angle proposed, so is the range known to the range required.

Suppose, for instance, it be found, that the range of a piece, elevated to 30° , is 2000 yards: to find the range of the same piece with the same charge when elevated to 45° ; take the sine of 60° , the double of 30° , and make it the first term of the rule of three; the second term must be the sine of 90° , the double of 45° , and the third the given range 2000; the fourth term will be 2310, the range of the piece at 45° . If the elevation be greater than 45° , instead of doubling it, take the sine of double its complement to 90° . As suppose the elevation of a piece be 50° , take the sine of 80° , the double of 40° . Again, if a determinate distance to which a shot is to be cast, be given, and the angle of elevation to produce that effect be required; the range known must be the first term in the rule of three, which suppose 2000 yards; the range proposed, which we suppose 1600 yards, the second term; and the sine of 60 double of the elevation for the range of 2000 yards, the third term. The fourth term will be found the sine of $43^{\circ} 52'$, whose half $21^{\circ} 56'$ is the angle of elevation the piece must have to produce the desired effect. And if $21^{\circ} 56'$ be taken from 90° , you will have $68^{\circ} 4'$ for the other elevation of the piece, with which the same effect will likewise be produced.

Note, to avoid the trouble of finding sines of double the angles of proposed elevations, Galileo and Torricelli give us the following table, wherein the signs of the angles sought are had by inspection.

10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350	360
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36

Degrees

Mortar,
Mortgage.

Degrees.	Degrees.	Ranges.	Degrees.	Degrees.	Ranges.
90	0	0	0	0	0
89	1	349	66	24	7431
88	2	698	65	25	7660
87	3	1045	64	26	7880
86	4	1392	63	27	8090
85	5	1736	62	28	8290
84	6	2090	61	29	8480
83	7	2419	60	30	8660
82	8	2556	59	31	8829
81	9	3090	58	32	8988
80	10	3420	57	33	9135
79	11	3746	56	34	9272
78	12	4067	55	35	9397
77	13	4384	54	36	9511
76	14	4695	53	37	9613
75	15	5000	52	38	9703
74	16	5299	51	39	9781
73	17	5592	50	40	9841
72	18	5870	49	41	9903
71	19	6157	48	42	9945
70	20	6428	47	43	9976
69	21	6691	46	44	9994
68	22	6947	45	45	10000
67	23	7193			

The use of the table is obvious. Suppose, for instance, it be known by experiment, that a mortar elevated 15° , charged with three pounds of powder, will throw a bomb to the distance of 350 fathoms; and it be required, with the same charge, to throw a bomb 100 fathoms farther; seek in the table the number answering to 15 degrees, and you will find it 5000. Then as 350 is to 450, so is 5000 to a fourth number, which is 6428. Find this number, or the nearest to it, in the table, and against it you will find 20° or 70° ; the proper angles of elevation.

MORTGAGE, in law, (*mortuum vadium*, or dead-pledge), is where a man borrows of another a specific sum (e. g. 200l.), and grants him an estate in fee, on condition that if he, the mortgagor, shall pay the mortgagee the said sum of 200l. on a certain day mentioned in the deed, that then the mortgagor may re-enter on the estate so granted in pledge; or, as is now the more usual way, that the mortgagee shall reconvey the estate to the mortgagor: in this case the land which is so put in pledge, is by law, in case of nonpayment at the time limited, for ever dead and gone from the mortgagor; and the mortgagee's estate in the lands is then no longer conditional, but absolute. But so long as it continues conditional, that is, between the time of lending the money and the time allotted for payment, the mortgagee is called *tenant in mortgage*. But as it was formerly a doubt, whether, by taking such estate in fee, it did not become liable to the wife's dower, and other incumbrances of the mortgage (though that doubt has been long ago over-ruled by our courts of equity), it therefore became usual to grant only a long term of years, by way of mortgage; with condition to be void on repayment of the mortgage-money: which course has been since continued, principally because on the death of the mortgagee such term becomes vested in his personal representatives, who alone are entitled in equity

to receive the money lent, of whatever nature the mortgage may happen to be.

As soon as the estate is created, the mortgagee may immediately enter on the lands; but is liable to be dispossessed, upon performance of the condition by payment of the mortgage-money at the day limited. And therefore the usual way is to agree that the mortgagor shall hold the land till the day assigned for payment; when, in case of failure, whereby the estate becomes absolute, the mortgagee may enter upon it and take possession, without any possibility at law of being afterwards evicted by the mortgagor, to whom the land is now for ever dead. But here again the courts of equity interpose; and though a mortgage be thus forfeited, and the estate absolutely vested in the mortgagee at the common law, yet they will consider the real value of the tenements compared with the sum borrowed. And if the estate be of greater value than the sum lent thereon, they will allow the mortgagor at any reasonable time to re-call or redeem his estate; paying to the mortgagee his principal, interest, and expences: for otherwise, in strictness of law, an estate worth 1000l. might be forfeited for non-payment of 100l. or a less sum. This reasonable advantage, allowed to mortgagors, is called the *equity of redemption*; and this enables a mortgagor to call on the mortgagee, who has possession of his estate, to deliver it back, and account for the rents and profits received on payment of his whole debt and interest, thereby turning the *mortuum* into a kind of *vivum vadium*; (see *VADIUM*). But, on the other hand, the mortgagee may either compel the sale of the estate, in order to get the whole of his money immediately; or else call upon the mortgagor to redeem his estate presently, or, in default thereof, to be for ever foreclosed from redeeming the same; that is, to lose his equity of redemption without possibility of recall. And also, in some cases of fraudulent mortgages, the fraudulent mortgagor forfeits all equity of redemption whatsoever. It is not, however, usual for mortgagees to take possession of the mortgaged estate, unless where the security is precarious, or small; or where the mortgagor neglects even the payment of interest: when the mortgagee is frequently obliged to bring an ejectment, and take the land into his own hands, in the nature of a pledge, or the *pignus* of the Roman law: whereas, while it remains in the hands of the mortgagor, it more resembles their *hypotheca*, which was where the possession of the thing pledged remained with the debtor. But by statute 7 Geo. II. c. 20. after payment or tender by the mortgagor of principal, interest, and costs, the mortgagee can maintain no ejectment; but may be compelled to re-assign his securities. In Glanvil's time, when the universal method of conveyance was by livery of seisin or corporal tradition of the lands, no gage or pledge of lands was good unless possession was also delivered to the creditor; *si non sequatur ipsius vadii traditio, curia domini regis hujusmodi privatas conventiones tueri non solet*: for which the reason given is, to prevent subsequent and fraudulent pledges of the same land; *cum in tali casu possit eadem res pluribus aliis creditoribus tum prius tum posterius invadiari*. And the frauds which have arisen, since the exchange of these public and noto-

Mortier
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Mortmain. law.

rious conveyances for more private and secret bargains, have well evinced the wisdom of our ancient law.

MORTIER, an ensign of dignity, borne by the chancellor and grand presidents of the parliament of France. That borne by the chancellor is a piece of cloth of gold, edged and turned up with ermine; and that of the first president is a piece of black velvet edged with a double row of gold-lace, while that of the other presidents is only edged with a single row. This they formerly carried on their heads, as they still do in grand ceremonies, such as the entry of the king; but ordinarily they carry them in the hand.

MORTIFICATION, in medicine and surgery, a total extinction of the natural heat of the body, or a part thereof. Some define mortification a disease, wherein the natural juices of any part quite lose their proper motion; and by that means fall into a fermentative one, and corrupt and destroy the texture of the part. See SURGERY.

MORTIFICATION, in religion, any severe penance observed on a religious account. How ancient and how universal the practice of it has been, and for what reasons observed, see FAST.

MORTIMER (John), a late English artist, born in 1743. According to Mr Strutt, "he was endowed with every requisite to make a great painter; his genius fertile, and his imagination lively. There is an originality in his works which add greatly to their value. No man perhaps touched in the heads and other extremities of his figures with more spirit; and few could draw them more correctly. When he failed, it was from his haste to express his thoughts; so that at times he did not attend with that precision which historical painting requires to the proportion of his figures; and they are sometimes heavy. This defect is, however, well repaid by the lightness of his pencil, and the freedom which appears in his works." He died at his house in Norfolk-street in 1779, aged 36.—"King John granting the Magna Charta to the barons," and the "Battle of Agincourt," two of his capital pictures, have been engraved. The first was nearly finished by Mr Ryland, and completed by Mr Bartolozzi. The last, intended as a companion to the former, was published by Mrs Mortimer.

MORTISE, or MORTOISE, in carpentry, &c. a kind of joint wherein a hole of a certain depth is made in a piece of timber, which is to receive another piece called a *tenon*.

* See Corporation.

MORTMAIN, or ALIENATION in *Mortmain*, (*in mortua manu*), is an alienation of lands or tenements to any corporation, sole or aggregate, ecclesiastical or temporal*: but these purchases having been chiefly made by religious houses, in consequence whereof the lands became perpetually inherent in one dead hand, this hath occasioned the general appellation of *mortmain* to be applied to such alienations, and the religious houses themselves to be principally considered in forming the statutes of mortmain: in deducing the history of which statutes, it will be matter of curiosity to observe the great address and subtle contrivance of the ecclesiastics in eluding from time to time the laws in being, and the zeal with which successive parliaments have pursued them through all their finesses:

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how new remedies were still the parents of new evasions; till the legislature at last, though with difficulty, hath obtained a decisive victory.

By the common law any man might dispose of his lands to any other private man at his own discretion, especially when the feudal restraints of alienation were worn away. Yet in consequence of these it was always, and is still necessary, for corporations to have a licence of mortmain from the crown, to enable them to purchase lands: for as the king is the ultimate lord of every fee, he ought not, unless by his own consent, to lose his privilege of escheats and other feudal profits, by the vesting of lands in tenants that can never be attainted or die. And such licences of mortmain seem to have been necessary among the Saxons above 60 years before the Norman conquest. But, besides this general licence from the king as lord paramount of the kingdom, it was also requisite, whenever there was a mesne or intermediate lord between the king and the alienor, to obtain his licence also (upon the same feudal principles) for the alienation of the specific land. And if no such licence was obtained, the king or other lord might respectively enter on the lands so alienated in mortmain, as a forfeiture. The necessity of this licence from the crown was acknowledged by the constitutions of Clarendon, in respect of advowsons, which the monks always greatly coveted, as being the groundwork of subsequent appropriations. Yet such were the influence and ingenuity of the clergy, that (notwithstanding this fundamental principle) we find that the largest and most considerable donations of religious houses happened within less than two centuries after the conquest. And (when a licence could not be obtained) their contrivance seems to have been this: That as the forfeiture for such alienations accrued in the first place to the immediate lord of the fee, the tenant who meant to alienate first conveyed his lands to the religious house, and instantly took them back again to hold as tenant to the monastery; which kind of instantaneous seisin was probably held not to occasion any forfeiture: and then, by pretext of some other forfeiture, surrender, or escheat, the society entered into those lands in right of such their newly acquired signiory, as immediate lords of the fee. But when these donations began to grow numerous, it was observed that the feudal services, ordained for the defence of the kingdom, were every day visibly withdrawn; that the circulation of landed property from man to man began to stagnate; and that the lords were curtailed of the fruits of their signiories, their escheats, wardships, reliefs, and the like: and therefore, in order to prevent this, it was ordained by the second of Kings Henry III.'s great charters, and afterwards by that printed in our common statute-books, that all such attempts should be void, and the land forfeited to the lord of the fee.

But as this prohibition extended only to religious houses, bishops and other sole corporations were not included therein; and the aggregate ecclesiastical bodies (who, Sir Edward Coke observes, in this were to be commended, that they ever had of their counsel the best learned men that they could get) found many means to creep out of this statute, by buying in lands that were *bona fide* holden of themselves as lords of the fee, and thereby evading the forfeiture; or by taking long

Blackst.
Comment.

leases.

Mortmain. leases for years, which first introduced those extensive terms, for a thousand or more years, which are now so frequent in conveyances. This produced the statute *de religiosis*, 7 Edward I.; which provided, that no person, religious or other whatsoever, should buy, or sell, or receive, under pretence of a gift, or term of years, or any other title whatsoever, nor should by any art or ingenuity appropriate to himself, any lands or tenements in mortmain; upon pain that the immediate lord of the fee, or, on his default for one year, the lords paramount, and, in default of all of them, the king, might enter thereon as a forfeiture.

This seemed to be a sufficient security against all alienations in mortmain: but as these statutes extended only to gifts and conveyances between the parties, the religious houses now began to set up a fictitious title to the land, which it was intended they should have, and to bring an action to recover it against the tenant; who, by fraud and collusion, made no defence, and thereby judgment was given for the religious house, which then recovered the land by a sentence of law upon a supposed prior title. And thus they had the honour of inventing those fictitious adjudications of right, which are since become the great assurance of the kingdom, under the name of *common recoveries*. But upon this the statute of Westminster the second, 13 Edw. I. c. 32. enacted, that in such cases a jury shall try the true right of the demandants or plaintiffs to the land; and if the religious house or corporation be found to have it, they shall still recover seisin; otherwise it shall be forfeited to the immediate lord of the fee, or else to the next lord, and finally to the king, upon the immediate or other lords default. And the like provision was made by the succeeding chapter, in case the tenants set up crosses upon their lands (the badges of knights templars and hospitallers) in order to protect them from the feudal demands of their lords, by virtue of the privileges of those religious and military orders. And so careful was this provident prince to prevent any future evasions, that when the statute of *quia emptores*, 18 Edward I. abolished all sub-infeudations, and gave liberty for all men to alienate their lands to be holden of their next immediate lord, a proviso was inserted that this should not extend to authorise any kind of alienation in mortmain. And when afterwards the method of obtaining the king's licence by writ of *ad quod damnum* was marked out by the statute 27 Edward I. ft. 2. it was farther provided by statute 34 Edward I. ft. 3. that no such licence should be effectual without the consent of the mesne or intermediate lords.

Yet still it was found difficult to set bounds to ecclesiastical ingenuity: for when they were driven out of all their former holds, they devised a new method of conveyance, by which the lands were granted, not to themselves directly, but to nominal feoffees to the use of the religious houses; thus distinguishing between the possession and the use, and receiving the actual profits, while the seisin of the land remained in the nominal feoffee; who was held by the courts of equity (then under the direction of the clergy) to be bound in conscience to account to his *cestuy que use* for the rents and emoluments of the estate. And it is to these inventions that our practisers are in-

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debted for the introduction of uses and trusts, the foundation of modern conveyancing. But, unfortunately for the inventors themselves, they did not long enjoy the advantage of their new device; for the statute 15 Richard II. c. 5. enacts, that the lands which had been so purchased to uses should be admortised by licence from the crown, or else be sold to private persons; and that for the future uses shall be subject to the statutes of mortmain, and forfeitable like the lands themselves. And whereas the statutes had been eluded by purchasing large tracts of land adjoining to churches, and consecrating them by the name of *church-yards*, such subtle imagination is also declared to be within the compass of the statutes of mortmain. And civil or lay corporations, as well as ecclesiastical, are also declared to be within the mischief, and of course within the remedy provided by those salutary laws. And lastly, as during the times of popery lands were frequently given to superstitious uses, though not to any corporate bodies; or were made liable in the hands of heirs and devisees to the charge of obits, chauntries, and the like, which were equally pernicious in a well-governed state as actual alienations in mortmain; therefore at the dawn of the Reformation, the statute 23 Hen. VIII. c. 10. declares, that all future grants of lands for any of the purposes aforesaid, if granted for any longer term than 20 years, shall be void.

But, during all this time, it was in the power of the crown, by granting a licence of mortmain, to remit the forfeiture, so far as related to its own rights; and to enable any spiritual or other corporation to purchase and hold any lands or tenements in perpetuity: which prerogative is declared and confirmed by the statute 18 Edw. III. ft. 3. c. 3. But as doubts were conceived at the time of the Revolution how far such licence was valid, since the king had no power to dispense with the statutes of mortmain by a clause of *non obstante*, which was the usual course, though it seems to have been unnecessary; and as, by the gradual decension of mesne signiories through the long operation of the statute of *quia emptores*, the rights of intermediate lords were reduced to a very small compass; it was therefore provided by the statute 7 & 8 W. III. c. 37. that the crown for the future at its own discretion may grant licences to alienate or take in mortmain, of whomsoever the tenements may be holden.

After the dissolution of monasteries under H. VIII. though the policy of the next popish successor affected to grant a security to the possessors of abbey-lands, yet, in order to regain so much of them as either the zeal or timidity of their owners might induce them to part with, the statutes of mortmain were suspended for 20 years by the statute 1 & 2 P. & M. c. 8. and during that time any lands or tenements were allowed to be granted to any spiritual corporation without any licence whatsoever. And long afterwards, for a much better purpose, the augmentation of poor livings, it was enacted by the statute 17 Car. II. c. 3. that appropriators may annex the great tithes to the vicarages; and that all benefices under 100 l. *per annum* may be augmented by the purchase of lands, without licence of mortmain in either case; and the like provision hath been since made in favour of the governors of queen Anne's bounty. It hath also been held, that the sta-

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Mortuary.

tute 23 Hen. VIII. before-mentioned, did not extend to any thing but superstitious uses; and that therefore a man may give lands for the maintenance of a school, an hospital, or any other charitable uses. But as it was apprehended from recent experience, that persons on their deathbeds might make large and improvident dispositions even for these good purposes, and defeat the political ends of the statutes of mortmain; it is therefore enacted by the statute 9 Geo. II. c. 36. that no lands or tenements, or money to be laid out thereon, shall be given for or charged with any charitable uses whatsoever, unless by deed indented, executed in the presence of two witnesses 12 kalendar months before the death of the donor, and enrolled in the court of chancery within six months after its execution (except stocks in the public funds, which may be transferred within six months previous to the donor's death), and unless such gift be made to take effect immediately, and be without power of revocation; and that all other gifts shall be void. The two universities, their colleges, and their scholars upon the foundation of the colleges of Eton, Winchester, and Westminster, are excepted out of this act: but such exemption was granted with this proviso, that no college shall be at liberty to purchase more advowsons than are equal in number to one moiety of the fellows or students upon the respective foundations.

MORTON (Thomas), a learned English bishop in the 17th century, was bred at St John's college, Cambridge, and was logic-lecturer of the university. After several preferments he was advanced to the see of Chester in 1615, and translated to that of Litchfield and Coventry in 1618; at which time he became acquainted with Antonio de Dominis archbishop of Spalatro, whom he endeavoured to dissuade from returning to Rome. While he was bishop of Litchfield and Coventry, in which see he sat 14 years, he educated, ordained, and presented to a living, a youth of excellent parts and memory, who was born blind; and detected the imposture of the famous boy of Bilson in Staffordshire, who pretended to be possessed with a devil. In 1632 he was translated to the see of Durham, in which he sat with great reputation till the opening of the long parliament, which met in 1640; when he received great insults from the common people, and was committed twice to custody. The parliament, upon the dissolution of bishoprics, voted him 800 l. *per annum*, of which he received but a small part. He died in 1659, in the 95th year of his age and 44th of his episcopal consecration. He published *Apologia Catholica*, and several other works; and was a man of extensive learning, great piety, and temperance.

MORTUARY, in law, is a sort of ecclesiastical heriot*, being a customary gift claimed by and due to the minister in very many parishes on the death of his parishioners. They seem originally to have been only a voluntary bequest to the church; being intended, as Lyndewode informs us from a constitution of archbishop Langham, as a kind of expiation and amends to the clergy for the personal tithes, and other ecclesiastical duties, which the laity in their life-time might have neglected or forgotten to pay. For this purpose, after the lord's heriot or best good was taken out, the second best chattel was reserved to the church as a mortuary. And therefore in the laws of king Canute,

this mortuary is called *soul-scot*, or *symbolum anime*. Mortuary. And, in pursuance of the same principle, by the laws of Venice, where no personal tithes have been paid during the life of the party, they are paid at his death out of his merchandize, jewels, and other moveables. So also, by a similar policy in France, every man that died without bequeathing a part of his estate to the church, which was called *dying without confession*, was formerly deprived of Christian burial; or, if he died intestate, the relations of the deceased, jointly with the bishop, named proper arbitrators to determine what he ought to have given to the church, in case he had made a will. But the parliament, in 1409, redressed this grievance.

It was anciently usual in England to bring the mortuary to church along with the corpse when it came to be buried; and thence it is sometimes called a *corse-present*: a term which bespeaks it to have been once a voluntary donation. However, in Bracton's time, so early as Henry III. we find it rivetted into an established custom: infomuch that the bequests of heriots and mortuaries were held to be necessary ingredients in every testament of chattels. *Imprimis autem debet quilibet, qui testamentum fecerit, dominum suum de meliori re quam habuerit recognoscere; et postea ecclesiam de alia meliori*: the lord must have the best good left him as an heriot; and the church the second best as a mortuary. But yet this custom was different in different places: *in quibusdam locis habet ecclesia melius animal de consuetudine; in quibusdam secundum, vel tertium melius; et in quibusdam nihil: et ideo consideranda est consuetudo loci*. This custom still varies in different places, not only as to the mortuary to be paid, but the person to whom it is payable. In Wales a mortuary or corse-present was due upon the death of every clergyman to the bishop of the diocese; till abolished, upon a recompence given to the bishop, by the statute 12 Ann. st. 2. c. 6. And in the archdeaconry of Chester a custom also prevailed, that the bishop, who is also archdeacon, should have, at the death of every clergyman dying therein, his best horse or mare, bridle, saddle, and spurs; his best gown or cloak, hat, upper garment under his gown, and tippet, and also his best signet or ring. But by statute 28 Geo. II. c. 6. this mortuary is directed to cease, and the act has settled upon the bishop an equivalent in its room. The king's claim to many goods, on the death of all prelates in England, seems to be of the same nature; though Sir Edward Coke apprehends, that this is a duty upon death, and not a mortuary: a distinction which seems to be without a difference. For not only the king's ecclesiastical character, as supreme ordinary, but also the species of the goods claimed, which bear so near a resemblance to those in the archdeaconry of Chester, which was an acknowledged mortuary, puts the matter out of dispute. The king, according to the record vouched by Sir Edward Coke, is entitled to fix things; the bishop's best horse or palfrey, with his furniture; his cloak or gown, and tippet; his cup and cover; his bason and ewer; his gold ring; and lastly, his *muta canum*, his mew or kennel of hounds.

This variety of customs with regard to mortuaries, giving frequently a handle to exactions on the one side, and frauds or expensive litigations on the other, it was thought proper by statute 21 Henry VIII. c. 6.

* See
Heriot.

Morus.

to reduce them to some kind of certainty. For this purpose it is enacted, that all mortuaries, or corse-presents to parsons of any parish, shall be taken in the following manner, unless where by custom less or none at all is due: *viz.* for every person who does not leave goods to the value of ten marks, nothing: for every person who leaves goods to the value of ten marks and under 30 pound, 3*s.* 4*d.* if above 30 pounds, and under 40 pounds, 6*s.* 8*d.* if above 40 pounds, of what value soever they may be, 10*s.* and no more. And no mortuary shall throughout the kingdom be paid for the death of any feme-covert; nor for any child; nor for any one of full age, that is not a housekeeper; nor for any wayfaring man; but such wayfaring man's mortuary shall be paid in the parish to which he belongs. And upon this statute stands the law of mortuaries to this day.

MORUS, the MULBERRY-TREE: A genus of the tetrandria order, belonging to the monœcia class of plants; and in the natural method ranking under the 53d order, *Scabridæ*. The male calyx is quadripartite; and there is no corolla: the female calyx is tetraphyllous; there is no corolla; two styles; the calyx like a berry, with one seed. There are seven species, *viz.*

Species. 1. The *nigra*, or common black-fruited mulberry-tree, rises with an upright, large, rough trunk, dividing into a branchy and very spreading head, rising 20 feet high, or more. It has large, heart-shaped, rough leaves; and monœcious flowers, succeeded in the females by large succulent black-berries. There is a variety with jagged leaves and smaller fruit.— 2. The *alba*, or white mulberry tree, rises with an upright trunk, branching 20 or 30 feet high; garnished with large, oblique, heart-shaped, smooth, light-green, shining leaves, and monœcious flowers succeeded by pale-whitish fruit. There is a variety with purplish fruit. 3. The *papyrifera*, or paper mulberry-tree of Japan, grows 20 or 30 feet high; having large palmed leaves, some trilobate, others quincelobed; and monœcious flowers, succeeded by small black fruit.— 4. The *rubra*, or red Virginia mulberry-tree, grows 30 feet high; is garnished with very large, heart-shaped, rough leaves, hairy underneath; and has monœcious flowers, succeeded by large reddish berries. 5. The *tinctoria*, dyer's mulberry, or fustic, has oblong leaves more extended on one side at the base, with axillary thorns. It is a native of Brasil and Jamaica. 6. The *tatarica*, or Tartarian mulberry, has ovate oblong leaves equal on both sides and equally serrated. It abounds on the banks of the Wolga and the Tanais. 7. The *indica*, or Indian mulberry, has ovate oblong leaves, equal on both sides, but unequally serrated.

The last three species are tender plants in this country; but the four first are very hardy, and succeed in any common soil and situation. The leaves are generally late before they come out, the buds seldom beginning to open till the middle or towards the latter end of May, according to the temperature of the season; and when these trees in particular begin to expand their foliage, it is a good sign of the near approach of fine warm settled weather; the white mulberry, however, is generally forwarder in leafing than the black. The flowers and fruit come out soon after the leaves; the males in amen-

tums, and the females in small roundish heads; neither of which are very conspicuous, nor possess any beauty, but for observation. The female or fruitful flowers always rise on the extremity of the young shoots, on short spurs; and with this singularity, that the calyxes of the flowers become the fruit, which is of the berry kind, and composed of many tubercles, each of them furnishing one seed. The fruit matures here gradually from about the middle of August until the middle of September. In dry warm seasons, they ripen in great perfection; but when it proves very wet weather, they ripen but indifferently, and prove devoid of flavour.

Uses, &c. Considered as fruit-trees, the *nigra* is the only proper sort to cultivate here; the trees being not only the most plentiful bearers, but the fruit is larger and much finer-flavoured than that of the white kind, which is the only other sort that bears in this country. The three next species are chiefly employed to form variety in our ornamental plantations; tho' abroad they are adapted to more useful purposes.

The fruit of the black mulberry is exceedingly grateful to the taste, and is considered at the same time as laxative and cooling. Like the other acid-sweet fruits, it allays thirst (as Dr Cullen observes), partly by refrigerating, and partly by exciting an excretion of mucus from the mouth and fauces; a similar effect is also produced in the stomach, where, by correcting putrescency, a powerful cause of thirst is removed. A syrup is made from the berries gathered before they are ripe, which, taken as a gargle, is excellent for allaying inflammations of the throat, and for cleansing ulcers in the mouth. The bark of the root, which has an acrid bitter taste, possesses a cathartic power; and has been successfully used as a vermifuge, particularly in cases of tænia: the dose is half a dram of the powder, or a dram of the infusion. The juice of the black mulberry is also employed to give a colour to certain liquors and confections. Some make from it a wine which is not disagreeable; others employ it for giving a high colour to red wine; which it likewise contributes to make sweet.—Although this juice is of no use in dyeing, it gives a red colour to the fingers and to linen, which it is very difficult to remove. Verjuice, sorrel, lemon, and green mulberries, remove spots of this kind from the hands: but with respect to linen, the best way is to wet the part which has been stained, and to dry it with the vapour of sulphur; the vitriolic acid which escapes from this substance during combustion, instantly takes off the stain.—The wood of the mulberry tree is yellow, tolerably hard, and may be applied to various uses in turnery and carving: But in order to separate the bark, which is rough, thick, thready, and fit for being made into ropes, it is proper to steep the wood in water.

Mulberry trees are noted for their leaves affording the principal food of that valuable insect the silk-worm. The leaves of the *alba*, or white species, are preferred for this purpose in Europe; but in China, where the best silk is made, the worms are said to be fed with those of the *morus tatarica*. The advantages of white mulberry trees are not confined to the nourishment of worms: they may be cut every three or four years like fallows and poplar trees, to make faggots; and

Morus.

Morus.

and the sheep eat their leaves in winter, before they are burnt. This kind of food, of which they are extremely fond, is very nourishing; it gives a delicacy to the flesh, and a fineness and beauty to the wool. In short, in every climate and in most fields, it might be proper, as is the case in Spain, to wait for the first hoar-frost shaking off the leaves, which are gathered and placed to dry in sheds or cart-houses, taking care always to stir them from time to time. In Spain, the sheep are fed on these leaves during the cold and frosts. By this method no injury is done to the mulberries, which produce leaves every year; and it is thought that the beauty and fineness of the Spanish wool is in a great measure owing to the use of this kind of food. From these considerations M. Bourgeois infers, that even in countries where, from the nature of the climate, the scarcity of workmen and the high price of labour, or any other particular causes, silk-worms could not be raised to any advantage, the cultivation of mulberry trees ought not be neglected.—The fruit of the white mulberry has a sweetish and very insipid taste. Birds, however, are very fond of it; and it is remarked that those which have been fed with such fruit are excellent eating.

The *papyrifera*, or paper-mulberry, is so called from the paper chiefly used by the Japanese being made of the bark of its branches; (see the article PAPER.) The leaves of this species also serve for food to the silk worm, and is now cultivated with success in France. It thrives best in sandy soils, grows faster than the common mulberry, and at the same time is not injured by the cold. M. de la Bouviere affirms that he procured a beautiful vegetable silk from the bark of the young branches of this species of mulberry, which he cut while the tree was in sap, and afterwards beat and steeped. The women of Louisiana procure the same kind of production from the shoots which issue from the stock of the mulberry; and which are four or five feet high. After taking off the bark, they dry it in the sun, and then beat it that the external part may fall off; and the internal part, which is fine bark, remains entire. This is again beaten, to make it still finer; after which they bleach it with dew. It is then spun, and various fabrics are made from it, such as nets and fringes: they even sometimes weave it and make it into cloth.—The finest sort of cloth among the inhabitants of Otaheite and others of the South Sea Islands, is made of the bark of this tree, in the manner particularly described under the article BARK.

The *tinctoria* is a fine timber-tree, and a principal ingredient in most of our yellow dyes, for which it is chiefly imported into Europe. The berries are sweet and wholesome; but not much used, except by the winged tribe, by whose care it is chiefly planted.

Culture of the Mulberry. From the nourishment which it affords to the silk-worm, that valuable insect to which we are indebted for the materials of our finest stuffs, the method of cultivating the mulberry tree must be peculiarly interesting wherever its culture can be undertaken with success. In France and Italy, vast plantations of the trees are made solely for their leaves to feed the little animals we have mentioned, which amply reward the possessors with the supply of silk which they spin from their bowels. Plantations of

Morus.

the mulberry have at different times been recommended in this country for the same purpose; though nothing has yet been done in that way to any extent, and even the expediency of any such attempt has been doubted by others, upon the ground of its interfering with other branches of rural economics more productive and more congenial to our climate.

In the European silk-countries, a great many varieties of mulberry trees are distinguished, arising from difference of climate, soil, method of culture, and other accidental causes. Among the wild mulberries, we meet with some whose leaves are roundish, and resembling those of a rose: hence they have been called the *rose-leaved* mulberry.

Mulberry trees were first cultivated in France in the reign of Charles IX. It has been found by experience that this tree is not so peculiar to warm countries, such as Spain, Italy, Provence, Languedoc, and Piedmont; but it may also thrive very well in colder countries, such as Touraine, Poitou, Maine, Anjou, Angoumois near Rochefoucault, and even in Germany, where it affords very good nourishment for silk-worms. They grow in all kinds of soil: they thrive best in strong and wet lands; but it is alleged that their leaves constitute too coarse food, prejudicial to the worms, and unfavourable to the quality of the silk.—A good light land is the best kind of soil for raising them. White mulberry trees have been found to grow in sandy soils where heath would scarcely vegetate; but their leaves are too dry, and afford not sufficient nourishment for the silk-worms.

Mulberry trees may be propagated either from shoots which have taken root, or by seed, by layers, and by slips. To raise black mulberry trees, the seed must be taken from the largest and most beautiful mulberries: in raising white ones, the seed is taken from the finest mulberries growing on trees with large whitish soft and tender leaves, and as little cut as possible. The best seed is commonly got from Piedmont, Languedoc, &c. According to M. Duhamel, that seed should be preferred which is gathered in countries where the cold is sometimes pretty severe; because in that case the trees are better able to resist the attacks of the frost. It frequently happens in severe winters, as M. Bourgeois observes, that the stalks of the young mulberry trees, especially during the first winter, are destroyed by the frost; but when they are cut close to the earth, they send forth as beautiful and vigorous stalks as the former. Good seed ought to be large, heavy, light coloured, to produce a great deal of oil when it is pressed, and to crackle when thrown on a red hot shovel. This seed must be sown in good land.

In the autumn of the second year, all those trees must be pulled up which have small leaves of a very deep green, rough, and deeply indented, for they would produce no leaves proper for the silk-worms.—In the third year, when the mulberry tree is about the thickness of the finger, it must be taken up and put in the nursery. According to M. Bourgeois, mulberries ought to be transplanted in the spring of the second year, which makes them thrive better, and sooner attain their growth. Without this transplantation, they would put forth only one root like a pivot, and most of them would be in danger of perishing when they are taken up to be put where they are intended.

Morus. tended to remain. Some cultivators of this tree tell us, that all the young trees, whether large or small, straight or crooked, ought to be cut close to the ground in the third year, that they may put forth a greater number of roots. Others never employ this method but with regard to those which are crooked, or in a languishing state.

*Encyclop.
Metho-
dique.*

White mulberries may be raised for the food of silk-worms, either in the form of a copse, or planted in a regular order, by letting them grow to their natural size. Ingrafting is one of the surest methods of procuring fine leaves from mulberries. Mulberries ingrafted on wild stocks chosen from a good kind, such as those which are produced from the seed of the Italian mulberry, commonly called the *rose-mulberry*, or of the Spanish mulberry, produce, as M. Bourgeois observes, much more beautiful leaves, and of a much better quality for silk-worms, than those which are ingrafted on the common or prickly small-leaved wild-stock. The same observation has been made by a great many cultivators of mulberries, and in particular by M. Thomé of Lyons, whose authority has the greatest weight in whatever regards the cultivation of mulberries and the rearing of silk-worms.

Ingrafted mulberries, it must be confessed, produce a greater number of leaves, and these more nourishing for silk-worms, than wild mulberries. The latter, however, it has been found by experience, may exist for two centuries; whereas the extension of leaves produced by ingrafting, occasions a premature dissipation of the sap of the tree, and thereby accelerates its decay. In a memoir inserted in a treatise on the culture of white mulberries by M. Pomier, it is recommended to ingraft white mulberries upon black ones; and there is reason to think that by following this plan the trees would exist much longer: for it is well known that the white mulberry commonly decays first in the root, whereas the black mulberry is not subject to any malady. In almost all the books on agriculture we find it asserted, that mulberries may be ingrafted on elms. "I will not affirm (says M. Duhamel), that this method of ingrafting has never been successful; but I have frequently tried it in vain, and I have many reasons for thinking that it cannot be attended with any advantage." In works of the same kind, we are likewise told, "that mulberries may be ingrafted on fig and lime trees; but in general such ingrafting will not succeed, unless there is a great analogy betwixt the trees, and particularly unless the sap is set in motion at the same time."

The greater care we take of mulberries, by dressing them, and lopping off the overgrown branches, they produce the greater plenty of good leaves. It is very prejudicial to the mulberries to strip them when too young of their leaves for the purpose of feeding the worms, because the leaves are the organs of perspiration in trees, and likewise contribute greatly to nutrition by means of their absorbing vessels which imbibe the moisture of the atmosphere. Mulberry trees are so plentifully stored with sap, that they renew their leaves sometimes twice or thrice. When the winter is mild, mulberry trees put forth their leaves very early: but it is always dangerous to accelerate the hatching of the worms in expectation

of this event; for no leaves can be depended upon till the beginning of May, those which are prior to this period being in danger of being destroyed by the frosts.

In Tuscany, especially in the neighbourhood of Florence, M. Nollet tells us, that though the inhabitants do not cultivate half so many mulberries as the Piedmontese, they rear and feed double the quantity, in proportion, of silk-worms. For this purpose they cause the worms hatch only at two different seasons. The first worms which are hatched are fed on the first produce of the mulberry-trees; and when these have produced their silk, other worms are hatched, which are nourished on the second crop of the same trees.

We are told by M. Bourgeois, that several kinds of white mulberries are now cultivated near Bienne in Switzerland. According to this author, the prickly mulberry is the least esteemed of all the white wild mulberries. Its branches are rough with prickles; its leaves are of a small size and few in number; and the reaping of them is difficult and expensive. The common wild mulberry produces indented leaves, oblong, and very slender; but it is worth being attended to, because it thrives very well when planted in a hedge, and in a favourable exposure: it is also earlier in the spring than the other species. The wild mulberry, which is produced from the rose or Italian ingrafted mulberry, bears a great many leaves, of a roundish shape and middling size, inclining to a light yellow, and of an excellent quality.

Of the white ingrafted mulberry-trees, the rose, or Italian ingrafted mulberry, which is now the species most cultivated in France, Italy, and Piedmont, produces great abundance of large thick and smooth leaves. It has now come into great repute, in consequence of the recommendation of M. Thomé, who prefers it to all other species of mulberry-trees for raising silk-worms. It is extremely delicate, however, and suffered greatly in Switzerland from the severe winters of 1766 and 1767. The mulberry called *Roman leaf* is distinguished from every other species by its very large leaves, some of which are frequently found equal in size to those of a gourd. The Spanish mulberry greatly resembles the wild rose-mulberry, except that its leaves are larger and more pointed. It is by no means delicate, and can resist the strongest frosts and the severest winters in cold climates. The leaves of the mulberry called the *small queen* are oblong, moderately large, and exceedingly smooth: This species is of an excellent quality and much esteemed.

MOSA, (anc. geog.) a river of Belgica, rising in mount Vogesus on the borders of the Lingones, and which, after receiving a part of the Rhine called *Vahalis*, forms the island of the Batavi, and passes off into the sea, at no greater distance than 80 miles: its mouth, which is large and broad, is that which Pliny calls *Helius*, denoting *Lower*, according to some German writers. Now called the *Maese*, or *Meuse*; rising in Champaign, on the borders of the county of Burgundy, or the Franche Compté, at a village called *Meuse*, whence the appellation; and running north through Lorrain and Champaign into the Netherlands: it afterwards directs its course north-east, and then west; and joining the Waal, runs to Dort, and

Moses.
Mosaic
Law.

falls into the German sea, a little below the Briel.— According to Baudrand, it twice receives the Waal; by the first junction forming the island Bommel; and again receives it at Worcum, from which place proceeding to Dort, it divides into two branches, which again uniting together form one large mouth discharging itself into the German sea.

MOSÆ PONS (anc. geog.), supposed to be Maestricht, situated on the Mase. E. Long. 5. 40. N. Lat. 50. 55.

Wilson's
Archæol.
Dict.

MOSAIC LAW, or the *Law of Moses*, is the most ancient that we know of in the world, and is of three kinds; the moral law, the ceremonial law, and the judicial law. The different manner in which each of these was delivered, may perhaps suggest to us a right idea of their different natures. The moral law, or ten commandments, for instance, was delivered on the

top of the mountain, in the face of the whole world, as being of universal influence, and obligatory on all mankind. The ceremonial was received by Moses in private in the tabernacle, as being of peculiar concern, belonging to the Jews only, and destined to cease when the tabernacle was down, and the vail of the temple rent. As to the judicial law, it was neither so publicly nor so audibly given as the moral law, nor yet so privately as the ceremonial; this kind of law being of an indifferent nature, to be observed or not observed, as its rites suit with the place and government under which we live. The five books of Moses called the *Pentateuch*, are frequently styled, by way of emphasis, *the Law*. This was held by the Jews in such veneration, that they would not allow it to be laid upon the bed of any sick person, lest it should be polluted by touching the dead.

Mosaic
Law.

A TABLE or HARMONY of the MOSAIC LAW, digested into proper HEADS, with REFERENCES to the several Parts of the PENTATEUCH where the respective LAWS OCCUR.

CLASS I. The Moral Law written on the two Tables, containing the Ten Commandments.

The *first table*, which includes
The first commandment, - - -

The second commandment, - - -

The third commandment, - - -

The fourth commandment, - - -

The *second table*, including

The fifth commandment, - - -

The sixth commandment, - - -

The seventh commandment, - - -

The eighth commandment, - - -

The ninth commandment, - - -

The tenth commandment, - - -

The sum of both tables, - - -

CLASS II. The Ceremonial Law may be fitly reduced to the following heads, viz.

Of the holy place, - - -

Of the matter and structure of the tabernacle, - - -

Of the instruments of the same, viz.

The laver of brass, - - -

The altar of burnt offering, - - -

The altar of incense, - - -

The candlestick of pure gold, - - -

The table of shew-bread, - - -

Of the priests and their vestments for glory and beauty, - - -

Of the choosing of the Levites, - - -

Of the priest's office in general, - - -

Of their office in teaching, - - -

Of their office in blessing, - - -

Of their office in offering; which function largely spreading itself, is divided into these heads, viz.

What the sacrifice ought to be, - - -

Of the continual fire, - - -

Of the manner of the burnt offerings, - - -

the peace offerings, - - -

Exod. chap.	Levitic. chap.	Numb. chap.	Deut. chap.
20. 23.	—	—	5. 6. 13.
20. 23. 34.	19. 20. 26.	—	4. 5. 6. 7. 8. 10. 11. 12. 13.
20. 23.	—	—	5.
20. 23. 31.	—	—	—
34. 35.	19. 23. 26.	—	—
20. 22.	19.	—	5.
20.	19.	—	5.
20.	18. 19.	—	5. 23.
20. 23.	19.	—	5.
20. 23.	19.	—	5.
20.	—	—	5.
—	19.	—	6.
20.	17.	—	12.
25. 26.	—	—	—
27. 35.	—	—	—
30.	—	—	—
27.	—	—	—
30.	—	—	—
25.	—	—	—
25. 26.	—	—	—
28.	—	—	—
—	—	18. 3. 8.	—
—	—	3. 18.	—
—	19. 10.	—	18. 12. 17. 31.
—	—	6.	—
—	22.	—	15. 17.
—	6.	—	—
—	6. 7.	—	—
—	3. 7.	—	—

Of

Of the manner of the sacrifices, according to their several kinds, viz.

For sin committed through ignorance of the law,

For sin committed through ignorance of the fact,

For sin committed wittingly, yet not through impiety,

The special law of sacrifices for sin,

Of things belonging to the sacrifices,

Of the shew-bread,

Of the lamps,

Of the sweet incense,

Of the use of ordinary oblations, whereof there were several kinds observed by the priests,

Of the consecration of the high priests and other priests,

Of the consecration and office of the Levites,

Of the dwelling of the Levites,

Of the anointing the altar, and all the instruments of the tabernacle,

Of the continual daily sacrifices,

Of the continual sabbath-day's sacrifice,

Of the solemn sacrifice for feast-days, which were diverse, and had peculiar rites, distinguished into these, viz.

Of trumpets,

Of beginning of months,

Of the three most solemn feasts in general,

Of the feast of passover,

Of the feast of pentecost,

Of the feast of tabernacles,

Of the feast of blowing the trumpets,

Of the feast of expiation,

Of the first fruits,

Of tythes,

Of fruits growing and not eaten of,

Of the first born,

Of the sabbatical year,

Of the year of jubilee,

Of vows in general,

What persons ought not to make vows,

What things cannot be vowed,

Of redemption of vows,

Of the vows of the Nazarites,

Of the laws proper for the priests, viz.

Of pollutions,

Of the high-priest's mourning,

Of his marriage,

Of the mourning of the ordinary priests,

Of their marriage,

Of their being forbid the use of wine, &c.

Of sanctified meats,

Of the office of the Levites, viz.

Teaching,

Offering,

Other promiscuous ceremonial laws, viz.

Of uncleanness in general,

Of uncleanness in meats, viz.

Of blood,

Of fat,

Of dead carcases,

Other meats, and diverse living creatures,

Of uncleanness in the issue of seed and blood,

In the dead bodies of men,

In the leprosy,

Exod.
chap.

Levitic.
chap.

Numb.
chap.

Deut.
chap.

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—	5. 7.	—	—
—	6.	5.	—
—	6. 7.	—	—
—	2. 6. 7.	15.	—
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27.	24.	8.	—
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19. 30.	6. 8.	—	—
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23. 34.	23.	—	16.
12. 13. 25.	23.	9. 28.	16.
34.	23.	28.	16.
23. 24.	23.	29.	16.
23. 34.	23.	29.	—
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30.	16. 13.	29.	—
22. 23. 34.	2.	15.	26.
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13. 22. 34.	—	—	15.
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—	6. 17. 19.	5. 18.	12. 15. 18.
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—	—	3. 4. 18.	10.
—	15. 19.	5.	—
23.	7. 17. 19.	—	12.
—	3. 7.	—	—
22.	17.	—	14.
—	11. 20.	—	14.
—	15. 12.	—	23.
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—	13. 14.	5.	—

Mosaic
Law.

Of circumcision, Gen. xvii.
 Of the water of expiation,
 Of the mourning of the Israelites,
 Of mixtures,
 Of their garments, and writing the law privately,
 Of young birds not to be taken with the dam,
 Of their paddle staves,

CLASS III. The Political Law.

N. B. The Magistrate is the Keeper of the Precepts of both Tables, and to have respect to human Society;—therefore the Political Laws of the Israelites are referred to both the Tables, and are to be reduced to the several Precepts of the Moral Law.

Laws referred to the first table namely,

1st. To the first and second commandments, viz.

Of idolators and apostates,
 Of abolishing idolatry,
 Of diviners and false prophets,
 Of covenants with other gods,

2d. To the third commandment, viz.

Of blasphemies,

3d. To the fourth commandment, viz.

Of breaking the sabbath,

Political laws referred to the second table,

1st. To the fifth commandment, viz.

Of magistrates and their authority,

Of the power of fathers,

2d. To the sixth commandment, viz.

Of capital punishments,
 Of wilful murder,
 Of manslaughter unwittingly committed, and of the cities of }
 refuge,
 Of heinous injury,
 Of punishments not capital,
 Of the law of war,

3d. To the seventh commandment, viz.

Of unlawful marriages,
 Of fornication,
 Of whoredom,
 Of adultery and jealousy,
 Of copulation against nature,
 Of divorcements,

Other matrimonial laws,

4th. To the eighth commandment, viz.

Of the punishment of thefts,
 Of sacrilege,
 Of not injuring strangers,
 Of not defrauding hirelings,
 Of just weights,
 Of removing the land-mark,
 Of lost goods,
 Of stray cattle,
 Of corrupted judgments,
 Of fire breaking out by chance,
 Of man-stealing,
 Of the fugitive servant,

Nº 230.

Exod.
chap.Levitic.
chap.Numb.
chap.Deut.
chap.Mosaic
Law.

—	12.	—	—
—	—	19.	—
—	19.	—	14.
—	19.	—	14.
—	—	15.	6. 11. 22.
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22.	20.	—	13. 17.
23. 24.	—	33.	7. 12.
22.	19. 20.	—	18.
23. 34.	—	—	7.
—	24.	15.	—
31. 35.	—	15.	—
18. 30.	—	11.	1. 13. 17. [23.]
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21.	24.	35.	19.
21.	—	35.	19. 21. 22.
21.	24.	—	25.
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22.	21.	—	22.
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22.	18. 20.	—	—
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21.	18. 20.	—	21. 22. 24. [25.]
22.	—	5.	—
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22. 23.	19.	—	10.
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22.	—	—	—
22. 23.	—	—	22.
23.	19.	—	16. 24.
22.	—	—	—
—	—	—	24.
—	—	—	23.

Of

	Exod. chap.	Levitic. chap.	Numb. chap.	Deut. chap.
Of gathering fruits,	—	19. 23.	—	23. 24.
Of contracts, viz.	—	—	—	15.
Borrowing,	—	—	—	24.
Of the pledge,	22.	—	—	23.
Of usury,	22.	25.	—	15.
Of selling,	21.	25.	—	—
Of the thing lent,	22.	—	—	—
Of a thing committed to be kept,	—	—	—	—
Of heirs,	—	—	—	—
5th. To the ninth commandment, viz.	—	—	—	—
Of witnesses,	—	5.	—	17. 19.
The establishing the political law,	—	—	—	4.
The establishing the divine law in general,	—	—	—	6. 11. 29.
From the dignity of the lawgiver,	—	19. 20. 22.	15.	30. 31.
From the excellency of the laws,	—	—	—	4. 5. 6. 7. 8.
From the promises,	15. 19. 23.	18. 26.	—	10. 26. 27.
From the threatenings,	24.	—	—	4. 26.
	23.	26.	—	4. 5. 6. 7.
	—	—	—	10. 11. 12.
	—	—	—	28.
	—	—	—	4. 7. 11.
	—	—	—	27. 28. 29.
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MOSAIC, or MOSAIC-WORK, an assemblage of little pieces of glass, marble, precious stones, &c. of various colours, cut square, and cemented on a ground of stucco, in such a manner as to imitate the colours and gradations of painting. The critics are divided as to the origin and reason of the name. Some derive it from *mosaicum*, a corruption of *musaicum*, as that is of *musivum*, as it was called among the Romans. Scaliger derives it from the Greek *μουσα*, and imagines the name was given to this sort of works as being very fine and ingenious. Nebriensis is of opinion it was so called, because *ex illis picturis ornabantur musea*.

1. Method of performing Mosaic work of glass is this: They provide little pieces of glass, of as many different colours and sizes as possible.

Now, in order to apply these several pieces, and out of them to form a picture, they in the first place procure a cartoon or design to be drawn; this is transferred to the ground or plaster by calking, as in painting in fresco. See FRESKO.

As this plaster is to be laid thick on the wall, and therefore will continue fresh and soft a considerable time, so there may be enough prepared at once to serve for as much work as will take up three or four days.

This plaster is composed of lime made of hard stone, with brick-dust very fine, gum tragacanth, and whites of eggs: when this plaster has been thus prepared and laid on the wall, and made the design of what is to be represented, they take out the little pieces of glass with a pair of plyers, and range them one after another, still keeping strictly to the light, shadow, different tints, and colours, represented in the design before; pressing or flattening them down with a ruler, which serves both to sink them within the ground and to render the surface even.

Thus, in a long time, and with a great deal of labour, they finish the work, which is still the more

beautiful, as the pieces of glass are more uniform, and ranged at an even height.

Some of these pieces of mosaic-work are performed with that exactness, that they appear as smooth as a table of marble, and as finished and masterly as a painting in fresco; with this advantage, that they have a fine lustre, and will last ages.

The finest works of this kind that have remained till our time, and those by whom the moderns have retrieved the art, which was in a manner lost, are those in the church of St Agnes, formerly the temple of Bacchus, at Rome; and some at Pisa, Florence, and other cities of Italy. The most esteemed among the works of the moderns are those of Joseph Pine and the Chevalier Lanfranc, in the church of St Peter at Rome: there are also very good ones at Venice.

2. The method of performing Mosaic-work of marble is this: The ground of Mosaic works, wholly marble, is usually a massive marble, either white or black. On this ground the design is cut with a chisel, after it has been first calked. After it has been cut of a considerable depth, *i. e.* an inch or more, the cavities are filled up with marble of a proper colour, first fashioned according to the design, and reduced to the thickness of the indentures with various instruments. To make the piece thus inserted into the indentures cleave fast, whose several colours are to imitate those of the design, they use a stucco, composed of lime and marble-dust; or a kind of mastic, which is prepared by each workman, after a different manner peculiar to himself. The figures being marked out, the painter or sculptor himself draws with a pencil the colours of the figures not determined by the ground, and in the same manner makes strokes or hatchings in the place where shadows are to be: and after he has engraven with the chisel all the strokes thus drawn, he fills them up with a black mastic, composed partly of Burgundy-pitch poured on hot; taking off afterwards what is superfluous with a

Mosaic.

piece of soft stone or brick, which, together with water and beaten cement, takes away the mastic, polishes the marble, and renders the whole so even that one would imagine it only consisted of one piece. This is the kind of Mosaic-work that is seen in the pompous church of the invalids at Paris, and the fine chapel at Versailles, with which some entire apartments of that palace are incrustated.

3. As for Mosaic-work of precious stones, other and finer instruments are required than those used in marble; as drills, wheels, &c. used by lapidaries and engravers on stone. As none but the richest marbles and stones enter this work, to make them go the farther, they are sawn into the thinnest leaves imaginable, scarce exceeding half a line in thickness; the block to be sawn is fastened firmly with cords on the bench, and only raised a little on a piece of wood, one or two inches high. Two iron pins, which are on one side the block, and which serve to fasten it, are put into a vice contrived for the purpose; and with a kind of saw or bow, made of fine brass-wire, bent on a piece of spongy wood, together with emery steeped in water, the leaf is gradually fashioned by following the stroke of the design, made on paper, and glued on the piece. When there are pieces enough fastened to form an entire flower, or some other part of the design, they are applied to the ground.

The ground which supports this Mosaic-work is usually of free-stone. The matter with which the stones are joined together is a mastic, or kind of flucco, laid very thin on the leaves as they are fashioned; and this being done, the leaves are applied with pliers.

If any contour, or side of a leaf, be not either squared or rounded sufficiently, so as to fit the place exactly into which it is to be inserted, when it is too large, it is to be brought down with a brass file or rasp; and if it be too little, it is managed with a drill and other instruments used by lapidaries.

Mosaic-work of marble is used in large works, as in pavements of churches, basilics, and palaces; and in the incrustation and vaneering of the walls of the same edifices.

As for that of precious stones, it is only used in small works, as ornaments for altar-pieces, tables for rich cabinets, precious stones being so very dear.

4. Manner of performing Mosaic-work of *gypsum*. Of this stone calcined in a kiln, beaten in a mortar, and sifted, the French workmen make a sort of artificial marbles, imitating precious stones; and of these they compose a kind of Mosaic-work, which does not come far short either of the durability or the vivacity of the natural stones; and which besides has this advantage, that it admits of continued pieces or paintings of entire compartments without any visible joining.

Some make the ground of plaster of Paris, others of free-stone. If it be of plaster of Paris, they spread it in a wooden frame, of the length and breadth of the work intended, and in thickness about an inch and a half. This frame is so contrived, that the tenons being only joined to the mortises by single pins, they may be taken asunder, and the frame be dismounted when the plaster is dry. The frame is covered on one side with a strong linen-cloth, nailed all round; which being placed horizontally with the linen at the bottom,

is filled with plaster passed through a wide sieve. When the plaster is half dry, the frame is set up perpendicularly, and left till it is quite dry; then it is taken out, by taking the frame to pieces.

In this Mosaic, the ground is the most important part. Now in order to the preparation of this sifted gypsum, which is to be applied on this ground, it is dissolved and boiled in the best English glue, and mixed with the colour that it is to be of; then the whole is worked up together into the usual consistence of plaster, and then is taken and spread on the ground five or six inches thick. If the work be such, as that mouldings are required, they are formed with gouges and other instruments.

It is on this plaster, thus coloured like marble or precious stone, and which is to serve as a ground to a work, either of lapis, agate, alabaster, or the like, that the design to be represented is drawn; having been first pounced or calqued. To hollow or impress the design, they use the same instruments that sculptors do; the ground whereon they are to work not being much less hard than the marble itself. The cavities being thus made in the ground, are filled with the same gypsum boiled in glue, only differently coloured, and thus are the different colours of the original represented. In order that the necessary colours and tints may be ready at hand, the quantities of the gypsum are tempered with the several colours in pots. After the design has been thus filled and rendered visible, by half-polishing it with brick and soft stone, they go over it again, cutting such plates as are either to be weaker or more shadowed, and filling them with gypsum; which work they repeat till all the colours being added one after the other, represent the original to the life. When the work is finished, they scour it with soft stone, sand, and water; after that, with a pumice-stone; and in the last place polish it with a wooden mullet and emery. Lastly, they gave it a lustre, by smearing it over with oil, and rubbing it a long time with the palm of the hand, which gives it a lustre no ways inferior to that of natural marble.

5. In Clavigero's history of Mexico is described a curious kind of Mosaic-work made by the ancient Mexicans of the most delicate and beautiful *feathers* of birds. They raised for this purpose various species of birds of fine plumage with which that country abounds, not only in the palaces of the king, where there were all sorts of animals, but likewise in private houses; and at certain seasons they carried off their feathers to make use of them on this kind of work, or to sell them at market. They set a high value on the feathers of those wonderful little birds which they call *Huitzitzilin*, and the Spaniards *Picaflores*, on account of the smallness, the fineness, and the various colours of them. In these and other beautiful birds, nature supplied them with all the colours which art can produce, and also some which art cannot imitate. At the undertaking of every Mosaic-work several artists assembled: After having agreed upon a design, and taken their measures and proportions, each artist charged himself with the execution of a certain part of the image, and exerted himself so diligently in it with such patience and application, that he frequently spent a whole day in adjusting a feather; first trying one, then another, viewing it sometimes one way, then

Mosaic.

another,

Moschus.

M. Pigmaea.



M. Memina.



M. Moschiferus.



Mordella.



M. Regulus.



Monoculus.



Motacilla.



M. Aatoria.



M. Helena.

Murana.

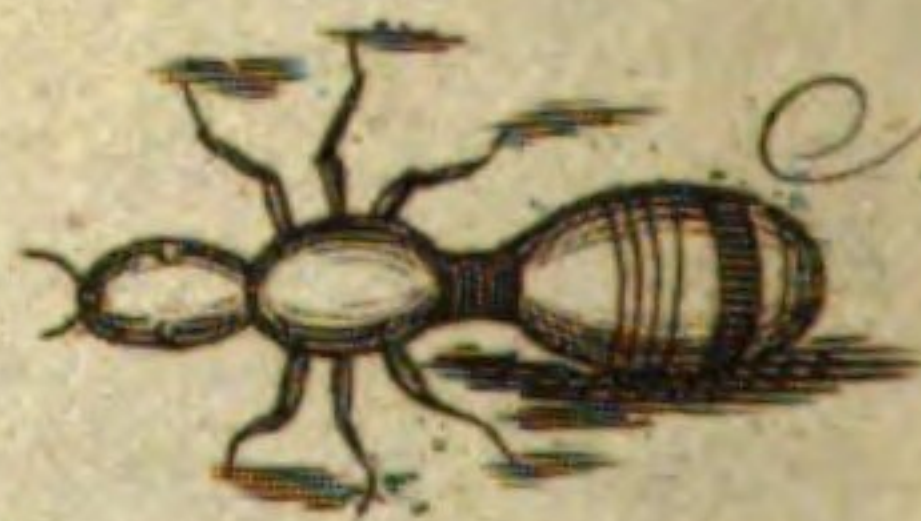
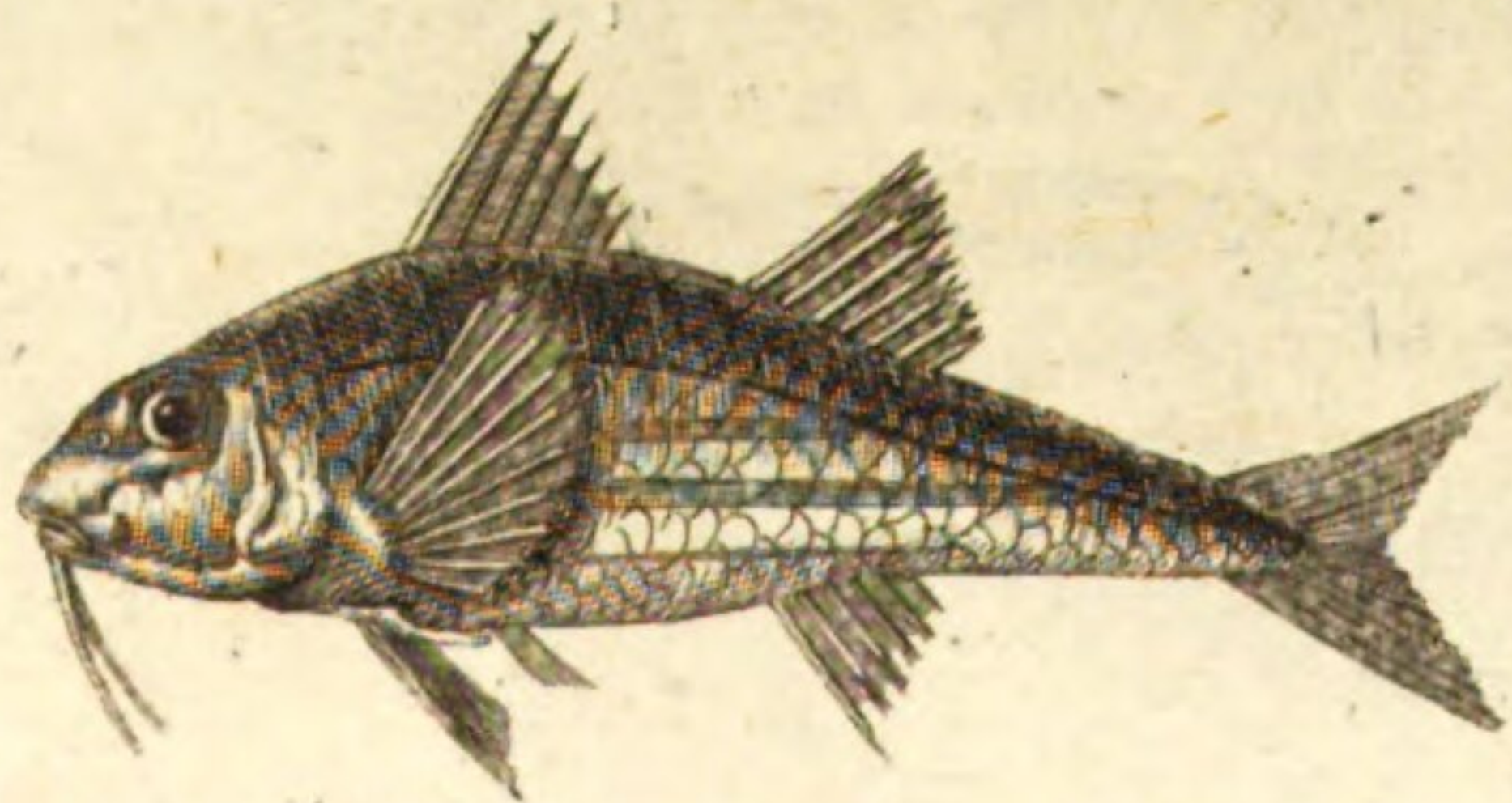


M. Siren.

Monodon.



Mullus.



Mutilla.

Mugil.



Mosaic,
Mofam-
bique.

another, until he found one which gave his part that ideal perfection proposed to be attained. When the part which each artist undertook was done, they assembled again to form the entire image from them. If any part was accidentally the least deranged, it was wrought again until it was perfectly finished. They laid hold of the feathers with small pincers, that they might not do them the least injury, and pasted them on the cloth with *txaubli*, or some other glutinous matter; then they united all the parts upon a little table, or a plate of copper, and flattened them softly until they left the surface of the image so equal and smooth that it appeared to be the work of a pencil.

These were the images so much celebrated by the Spaniards and other European nations. Whoever beheld them was at a loss whether he ought to have praised most the life and beauty of the natural colours, or the dexterity of the artist and the ingenious disposition of art. "These images (says Acosta) are deservedly admired; for it is wonderful how it was possible, with the feathers of birds, to execute works so fine and so equal, that they appear the performance of the pencil; and what neither the pencil nor the colours in painting can effect, they have, when viewed from a side, an appearance so beautiful, so lively, and animated, they give delight to the sight. Some Indians, who are able artists, copy whatever is painted with a pencil so perfectly with plumage, that they rival the best painters of Spain." These works of feathers were even so highly esteemed by the Mexicans as to be valued more than gold. Cortes, Bernal Diaz, Gomara, Torquemada, and all the other historians who saw them, were at a loss for expressions sufficient to praise their perfection. Several works of this kind, our author says, are still preserved in the museums of Europe, and many in Mexico; but few, he apprehends, belong to the sixteenth century, and still fewer, if any, are of those made before the conquest. The Mosaic-works also which the Mexicans made of broken shells was extremely curious: this art is still practised in Guatimala.

MOSAMBIQUE, a kingdom of Africa, lying south of Quiloa, and taking its name from the chief town, which is situated on an island, at the mouth of a river of the same name, in 15 deg. S. Lat. The island is 30 miles in circumference, and very populous, though the air is said to be very hot, and the soil in general dry, sandy, and barren; yet they have most of the tropical fruits, with black cattle, hogs, and sheep. There is a kind of fowl here, both the feathers and flesh of which are black, inasmuch that, when they are boiled, the broth looks like ink; and yet their flesh is very delicate and good food. The town of Mosambique is regularly fortified, and has a good harbour, defended by a citadel, with several churches and monasteries. The Portuguese shipping to and from India touch here for refreshments. As the island abounds in cattle, the Portuguese slaughter and salt up a great deal of beef, which they afterwards send to the Brazils, or sell to the European shipping. They also barter European goods with the natives for gold, elephants teeth, and slaves. There is another town, called *Mongale*, situated also on an island, and garrisoned by the Portuguese, being their chief magazine for European goods. The gold they receive from

the natives is found near the surface of the earth, or in the sands of rivers; no gold mines, or at least very few, being at present wrought in Africa.

MOSCHION, a name common to four different writers, whose compositions, character, and native place, are unknown. Some fragments of their writings remain, some few verses, and a treatise *De mulierum affectibus*.

MOSCHUS, a Grecian poet of antiquity, usually coupled with Bion; and they were both of them contemporaries with Theocritus. In the time of the latter Grecians, all the ancient Idylliums were collected and attributed to Theocritus; but the claims of Moschus and Bion have been admitted to some few little pieces; and this is sufficient to make us inquisitive about their characters and story: yet all that can be known about them must be collected from their own remains. Moschus, by composing his delicate elegy on Bion, has given the best memorials of Bion's life. See BION. Moschus and Theocritus have by some critics been supposed the same person; but there are irrefragable evidences against it: others will have him as well as Bion to have lived later than Theocritus, upon the authority of Suidas: while others again suppose him to have been the scholar of Bion, and probably his successor in governing the poetic school; which, from the elegy of Moschus, does not seem unlikely. Their remains are to be found in all the editions of the *Poeta Minores*.

MOSCHUS, in zoology; a genus of quadrupeds of the order of pecora, having no horns. There are eight small cutting teeth in the lower jaw; in the upper, no cutting or fore teeth; but two long tusks, one on each side, projecting out of the mouth.

1. The moschiferus, or Thibet musk, has a bag or tumour on the belly near the navel, and a very short tail almost hid in the fur. The length of the male is about three feet three inches from the nose to the origin of the tail, and about two feet three inches high at the shoulder; the female is less than the male, has a sharper nose, has no tusks nor musk-bag, and is provided with two teats. The head resembles that of the roe: the fur is coarse like that of the animals of the deer kind; but softer, very smooth, erect, plentiful, thick, and long: the colour varies according to the age of the animal and time of the year; but is chiefly blackish brown on the upper, and hoary, seldom white, on the under parts of the body; the hoofs are long, black, and much divided, and the spurious hoofs of the fore feet are very long: the scrotum is of a bright red colour, and the penis very small. It inhabits the Asiatic Alps, especially the highest rocky mountains from the Altaic chain to that which divides Thibet from India; likewise in China and Tonquin, and in eastern Siberia about lake Baikal and the rivers Jenisea and Argun. It avoids mankind, dwelling solitarily in the most precipitous places of the mountains, among rocks in the small narrow valleys surrounded by these snowy hills, and the pine forests which grow in their interstices. It is a very gentle and timid animal, except in rutting time, when the males fight violently with their tusks for the females; it is exceedingly active in leaping, running, climbing, and swimming, and is very difficultly tamed; the flesh is eatable, and that of the younger animals is reckoned delicate. The

Plate
CCCXV.

Moschus. chace of them is a trade equally difficult and hazardous; if pursued, they seek the highest tops of the snowy peaks, inaccessible to men or dogs. They take amazing leaps over the tremendous chasms of their alps, or from rock to rock; treading so light on the snow with their true and false hoofs extended, as scarcely to leave a mark; while the dogs which pursue them sink in, and are forced to desist from the chase. They are so fond of liberty as never to be kept alive in captivity. They are mostly taken in snares, or shot by crossbows placed in their tracks, with a string from the trigger for them to tread on, and discharge. The Tungusi shoot them with bows and arrows. The skins are used for bonnets and winter dresses. The Russians often scrape off the hair, and have a way of preparing them for summer cloathing, so as to become as soft and shining as silk. The noted drug the musk is produced from the male. The bag or follicle that contains it is situated near the prepuce; and is of a somewhat oval figure, flat on one side and rounded on the other, having a small open orifice. In young animals this bag is empty; but in adults it is filled with a clotted, oily, friable matter, of a dark brown colour: this is the true musk, of which each bag contains from a dram and a half to two drams. The best comes from Thibet; that which is produced in Siberia having somewhat of the flavour of castor.

2. The *Americanus*, or Brazilian musk, of a reddish brown colour, with a black muzzle and white throat, is scarcely so large as a roe-buck. The fur is soft and short; the colour of the head and upper part of the neck is dark brown; the lower part of the neck and throat are white; the body and limbs are reddish brown; the hind legs are longer than the fore. This animal, which inhabits Guiana and Brasil, is exceedingly timid, active, and swift. Numbers are frequently seen swimming the rivers, and at that time are easily taken. The Indians hunt them, and their flesh is esteemed very delicate. The French of Guiana call them *biches* or does, because, notwithstanding their likeness to deer, both sexes are without horns. Gmelin suspects this animal may only be a fawn of the American roe.

3. The *Indicus*, or Indian musk, has short hair of a tawney colour on the upper and whitish on the under parts of the body; the tail is short, and the feet have spurious hoofs. It inhabits India, and is much of the same size with the *moschiferus*, but the tail is longer and more perceptible; the legs are very slender; and the head resembles that of a horse, with erect oblong ears.

4. The *pigmæus*, or pigmy musk, is marked as to colour like the former, but has no spurious hoofs. The body and head measure only nine inches and a half in length; the tail is about an inch long; and the legs are smaller than a man's finger. It inhabits the East Indies and several of the Indian islands. It is called *kant-chel* by the Malayes, and *poet-jang* by the inhabitants of Java. The natives catch them in great numbers, carry them in cages to market, and sell them for 2½ d. a piece.

5. The *meminna*, or Ceylon chevrotin, is in length 17 inches from the nose to the rump, and of a cinereous olive colour; the throat, breast, and belly, are white; the sides and haunches spotted, and barred

transversely with white; and the ears are large and open: the tail is very short; and the feet have no spurious hoofs. It inhabits Ceylon and Java.

6. The *javanicus*, or Javan musk, is of a ferruginous colour on the upper parts of the body, and white all along the under; the tail is long and hairy, white below and at the tip; its legs are similar to those of the pigmy musk, and furnished with very small spurious hoofs. This and the *meminna* seem only varieties of the *pigmæus*.

MOSCOW, the chief province of the empire of Russia, deriving its name from the river Muscova, or Moskva, on which the capital is situated. It was from this duchy that the czars of old took the title of *dukes of Muscovy*. The province is bounded on the north by the duchies of Twere, Rostow, Sudal, and Wolodimer; on the south by Rezan, from which it is separated by the river Occa; on the east by the principality of Cachine, and the same river Occa parting it from Nisi novogorod; and on the west by the duchies of Rzeva, Biela, and Smolensko. It extends about 200 miles in length, and about 100 in breadth; and is watered by the Moskva, Occa, and Clefma, which fall into the Wolga: nevertheless, the soil is not very fertile. The air, however, though sharp, is salubrious; and this consideration, with the advantage of its being situated in the midst of the best provinces in the empire, induced the czars to make it their chief residence. In the western part of Moscow is a large forest, from whence flows the celebrated river Nieper, or Borysthenes, which, traversing the duchy of Smolensko, winds in a serpentine course to Ukraine, Lithuania, and Poland.

Moscow, the capital of the above province, and till the beginning of the present century the metropolis of all Russia, is situated in a spacious plain on the banks of the river Muscova. The Russian antiquaries differ considerably in their opinions concerning the first foundation of Moscow; the following relation, Mr Coxe says, is generally esteemed by the best authors the most probable account.

Kiof was the metropolis, when George son of Vladimir Monomaka ascended in 1154 the Russian throne. That monarch, being insulted in a progress through his dominions by a rich and powerful nobleman named Stephen Kutchko, put him to death, and confiscated his domains, which consisted of the lands now occupied by the city of Moscow and the adjacent territory. Pleased with the situation of the ground lying at the conflux of the Moskva and Neglina, he laid the foundation of a new town, which he called Moskva from the river of that name. Upon the demise of George, the new town was not neglected by his son Andrew, who transferred the seat of empire from Kiof to Vladimir; but it fell into such decay under his immediate successors, that when Daniel, son of Alexander Nevski, received, in the division of the empire, the duchy of Muscovy as his portion, and fixed his residence upon the conflux of the Moskva and Neglina, he may be said to have new founded the town. The spot now occupied by the Kremlin was at that time overspread with a thick wood and a morass, in the midst whereof was a small island containing a single wooden hut. Upon this part Daniel constructed churches and monasteries, and various buildings, and enclosed

Moscow. enclosed it with wooden fortifications: he first assumed the title of duke of Moscow; and was so attached to this situation, that when in 1304 he succeeded his brother Andrew Alexandrovich in the great duchy of Vladimir, he did not remove his court to Vladimir, but continued his residence at Moscow, which then became the capital of the Russian dominions. His successors followed his example; among whom his son Ivan considerably enlarged the new metropolis, and in 1367 his grandson Demetrius Ivanovitch Donski surrounded the Kremlin with a brick wall. These new fortifications, however, were not strong enough to prevent Tamerlane in 1382 from taking the town, after a short siege. Being soon evacuated by that desultory conqueror, it again came into the possession of the Russians; but was frequently invaded and occupied by the Tartars, who in the 14th and 15th centuries over-ran the greatest part of Russia, and who even maintained a garrison in Moscow until they were finally expelled by Ivan Vassilievitch I. To him Moscow is indebted for its principal splendor, and under him it became the principal and most considerable city of the Russian empire.

Moscow continued the metropolis of Russia until the beginning of the present century, when, to the great dissatisfaction of the nobility, but with great advantage probably to the state, the seat of empire was transferred to Petersburg.

Notwithstanding the predilection which Peter conceived for Petersburg, in which all the succeeding sovereigns excepting Peter II. have fixed their residence, Moscow, according to Mr Coxe, is still the most populous city of the Russian empire. Here the chief nobles who do not belong to the court of the empress reside: they here support a larger number of retainers; they love to gratify their taste for a ruder and more expensive magnificence in the ancient style of feudal grandeur; and are not, as at Petersburg, eclipsed by the superior splendor of the court.

Moscow is represented as the largest town in Europe; its circumference within the rampart, which encloses the suburbs, being exactly 39 versts or 26 miles; but it is built in so straggling and disjointed a manner, that its population in no degree corresponds to its extent. Some Russian authors state its inhabitants at 500,000 souls, a number evidently exaggerated. According to a late computation, which Mr Coxe says may be depended upon, Moscow contains within the ramparts 250,000 souls, and in the adjacent villages 50,000. The streets of Moscow are in general exceedingly long and broad: some of them are paved; others, particularly those in the suburbs, are formed with trunks of trees, or are boarded with planks like the floor of a room; wretched hovels are blended with large palaces; cottages of one story stand next to the most superb and stately mansions. Many brick structures are covered with wooden tops; some of the wooden houses are painted; others have iron doors and roofs. Numerous churches present themselves in every quarter, built in a peculiar style of architecture; some with domes of copper, others of tin, gilt or painted green, and many roofed with wood. In a word, some parts of this vast city have the look of a sequestered desert, other quarters of a populous

Moscow. town; some of a contemptible village, others of a great capital.

Moscow may be considered as a town built upon the Asiatic model, but gradually becoming more and more European, and exhibiting in its present state a motley mixture of discordant architecture. It is distributed into the following divisions. 1. The Kremlin. This stands in the central and highest part of the city; is of a triangular form, and about two miles in circumference; and is surrounded by high walls of stone and brick, which were constructed in the year 1491, under the reign of Ivan Vassilievitch I. It contains the ancient palace of the czars, several churches, two convents, the patriarchal palace, the arsenal now in ruins, and one private house, which belonged to Boris Godunof before he was raised to the throne. 2. Khitaigorod, or the Chinese town, is inclosed on one side by that wall of the Kremlin which runs from the Moskva to the Neglina; and on the other side by a brick wall of inferior height. It is much larger than the Kremlin, and contains the university, the printing-house, and many other public buildings, and all the tradesmens shops. The edifices are mostly stuccoed or white-washed, and it has the only street in Moscow in which the houses stand close to one another without any intervals between them. 3. The Bielgorod, or White Town, which runs quite round the two preceding divisions, is supposed to derive its name from a white wall with which it was formerly enclosed, and of which some remains are still to be seen. 4. Semlainogorod, which environs all the three other quarters, takes its denomination from a circular rampart of earth with which it is encompassed. These two last mentioned divisions exhibit a grotesque groupe of churches, convents, palaces, brick and wooden houses, and mean hovels, in no degree superior to peasants cottages. 5. The Sloboda, or suburbs, form a vast exterior circle round all the parts already described, and are invested with a low rampart and ditch. These suburbs contain, beside buildings of all kinds and denominations, corn-fields, much open pasture, and some small lakes, which give rise to the Neglina. The river *Moskva*, from which the city takes its name, flows through it in a winding channel; but, excepting in spring, is only navigable for rafts. It receives the Yausa in the Semlainogorod, and the Neglina at the western extremity of the Kremlin; the beds of both these last-mentioned rivulets are in summer little better than dry channels.

The places of divine worship at Moscow are exceedingly numerous: including chapels, they amount to above 1000: there are 484 public churches, of which 199 are of brick, and the others of wood; the former are commonly stuccoed or white-washed, the latter painted of a red colour. The most ancient churches of Moscow are generally square buildings, with a cupola and four small domes, some whereof are of copper or iron gilt; others of tin, either plain or painted green. These cupolas and domes are for the most part ornamented with crosses entwined with thin chains or wires. The church of the Holy Trinity, sometimes called the church of Jerusalem, which stands in the Khitaigorod, close to the gate leading into the Kremlin, has a kind of high steeple and nine or ten

Moscow. domes: it was built in the reign of Ivan Vassilievitch II. The inside of the churches is mostly composed of three parts: that called by the Greeks *συναγωγὴ*, by the Russians trapeza; the body; and the sanctuary or shrine. Over the door of each church is the portrait of the saint to whom it is dedicated, to which the common people pay their homage as they pass along by taking off their hats, crossing themselves, and occasionally touching the ground with their heads. The bells, which form no inconsiderable part of public worship in this country, as the length or shortness of their peals ascertains the greater or lesser sanctity of the day, are hung in belfreys detached from the church: they do not swing like our bells; but are fixed immoveably to the beams, and are rung by a rope tied to the clapper and pulled sideways. Some of these bells are of a stupendous size; one in the tower of St Ivan's church weighs 3551 Russian poods, or 127,836 English pounds. It has always been esteemed a meritorious act of religion to present a church with bells; and the piety of the donor has been measured by their magnitude. According to this mode of estimation, Boris Godunof, who gave a bell of 288,000 pounds to the cathedral of Moscow, was the most pious sovereign of Russia, until he was surpassed by the empress Anne, at whose expence a bell was cast weighing 432,000 pounds, and which exceeded in bigness every bell in the known world. The height of this enormous bell is 19 feet, its circumference at the bottom 21 yards 11 inches; its greatest thickness 23 inches. The beam to which this vast machine was fastened being accidentally burnt, the bell fell down, and a fragment was broken off towards the bottom, which left an aperture large enough to admit two persons a-breast without stooping.

The palace, inhabited by the ancient czars, stands at the extremity of the Kremlin. Part of this palace is old, and remains in the same state in which it was built under Ivan Vassilievitch I. The remainder has been successively added at different intervals without any plan, and in various styles of architecture, which has produced a motley pile of building, remarkable for nothing but the incongruity of the several structures. The top is thickly set, with numerous little gilded spires and globes; and a large portion of the front is decorated with the arms of all the provinces which compose the Russian empire. The apartments are in general exceedingly small, excepting one single room called the council-chamber, in which the ancient czars used to give audience to foreign ambassadors, and which has been repeatedly described by several English travellers who visited Moscow before the Imperial residence was transferred to Petersburg. The room is large and vaulted, and has in the centre an enormous pillar of stone which supports the ceiling. In this palace Peter the Great came into the world, in the year 1672. In that part called the treasury are repositied the crown, jewels, and royal robes, used at the coronation of the sovereign, besides several curiosities relative to the history of the country. Of the great number of churches contained in this city, two in particular, namely, that of St Michael and that of the Assumption of the Virgin Mary, are remarkable; the one for being the place where the sovereigns of Russia were formerly interred, and the other where they are

Moscow. crowned. These edifices, which are situated in the Kremlin, are both in the same style of architecture; and their exterior form, though modelled according to the ancient style of the country, is not absolutely inelegant. In the cathedral of St Michael, which contains the tombs of the Russian sovereigns, the bodies are not, as with us, deposited in vaults, or beneath the pavement, but are entombed in raised sepulchres, mostly of brick, in the shape of a coffin, and about two feet in height. When Mr Coxe visited the cathedral, the most ancient were covered with palls of red cloth, others of red velvet, and that of Peter II. with gold tissue, bordered with silver fringe and ermine. Each tomb has at its lower extremity a small silver plate, upon which is engraved the name of the deceased sovereign, and the æra of his death.

The cathedral of the assumption of the Virgin Mary, which has long been appropriated to the coronation of the Russian sovereigns, is the most splendid and magnificent in Moscow. The screen is in many parts covered with plates of solid silver and gold richly worked. From the centre of the roof hangs an enormous chandelier of massy silver, weighing 2940 pounds: it was made in England, and was a present from Morosof, prime minister, and favourite of Alexey Michaelovitch. The sacred utensils and episcopal vestments are extraordinarily rich, but the taste of the workmanship is in general rude, and by no means equal to the materials. Many of the paintings which cover the inside walls are of a Colossal size: some are very ancient, and were executed so early as in the latter end of the 15th century. It contains, amongst the rest, a head of the virgin, supposed to have been delineated by St Luke, and greatly celebrated in this country for its sanctity and the power of working miracles. Its face is almost black; its head is ornamented with a glory of precious stones, and its hands and body are gilded, which gives it a most grotesque appearance. It is placed in the screen, and enclosed within a large silver covering, which is only taken off on great festivals, or for the curiosity of strangers. In this cathedral are deposited the remains of the Russian patriarchs.

The place in the Khitaigorod, where the public archives are deposited, is a strong brick building, containing several vaulted apartments with iron floors. These archives, consisting of a numerous collection of state-papers, were crowded into boxes, and thrown aside like common lumber, until the present empress ordered them to be revised and arranged. In conformity to this mandate, Mr Muller has disposed them in chronological order with such perfect regularity, that any single document may be inspected with little trouble. They are enclosed in separate cabinets with glass doors: those relative to Russia are all classed according to the several provinces which they concern; and over each cabinet is inscribed the name of the province to which it is appropriated. In the same manner the manuscripts relative to foreign kingdoms are placed in separate divisions under the respective titles of Poland, Sweden, England, France, Germany, &c.

The university of Moscow, also situated in the Khitaigorod, was founded, at the instance of Count Shuvalof, by the empress Elizabeth, for 600 students; who are clothed,

Moscow. clothed, boarded, and instructed, at the expence of the crown. Besides this institution, there are two gymnasia or seminaries for the education of youth, endowed also by Elizabeth; in which are taught, by twenty-three philosophers, divinity, classics, philosophy, the Greek, Latin, Russian, German, French, Italian, and Tartar languages; history, geography, mathematics, architecture, fortification, artillery, algebra, drawing and painting, music, fencing, dancing, reading and writing.

Moscow is the centre of the inland commerce of Russia, and particularly connects the trade between Europe and Siberia. The only navigation to this city is formed by the Moskva, which falling into the Occa near Columna, communicates by means of that river with the Volga. But as the Moskva is only navigable in spring upon the melting of the snows, the principal merchandize is conveyed to and from Moscow upon sledges in winter. As to the retail commerce here, the whole of it is carried on in the Khitaigorod; where, according to a custom common in Russia, as well as in most kingdoms of the East, all the shops are collected together in one spot. The place is like a kind of fair, consisting of many rows of low brick buildings; the interval between them resembling alleys. These shops or booths occupy a considerable space; they do not, as with us, make part of the houses inhabited by the tradesmen, but are quite detached from their dwellings, which for the most part are at some distance in another quarter of the town. The tradesman comes to his shop in the morning, remains there all day, and returns home to his family in the afternoon. Every trade has its separate department; and they who sell the same goods have booths adjoining to each other. Furs and skins form the most considerable article of commerce in Moscow; and the shops which vend those commodities occupy several streets.

Among the curiosities of Moscow, the market for the sale of houses is not the least remarkable. It is held in a large open space in one of the suburbs; and exhibits a great variety of ready-made houses, thickly strewed upon the ground. The purchaser who wants a dwelling, repairs to this spot, mentions the number of rooms he requires, examines the different timbers, which are regularly numbered, and bargains for that which suits him. The house is sometimes paid for on the spot, and taken away by the purchaser; or sometimes the vender contracts to transport and erect it upon the place where it is designed to stand. It may appear incredible to assert, that a dwelling may be thus bought, removed, raised, and inhabited, within the space of a week; but we shall conceive it practicable by considering that these ready-made houses are in general merely collections of trunks of trees tenanted and mortised at each extremity into one another, so that nothing more is required than the labour of transporting and adjusting them. But this summary mode of building is not always peculiar to the meaner hovels; as wooden structures of very large dimensions and handsome appearance are occasionally formed in Russia with an expedition almost inconceivable to the inhabitants of other countries. A remarkable instance of this dispatch was displayed the last time the empress came to Moscow. Her ma-

jesty proposed to reside in the mansion of prince Galitzin, which is esteemed the completest edifice in this city; but as it was not sufficiently spacious for her reception, a temporary addition of wood, larger than the original house, and containing a magnificent suite of apartments, was begun and finished within the space of six weeks. This meteor-like fabric was so handsome and commodious, that the materials which were taken down at her majesty's departure, were to be re-constructed as a kind of imperial villa upon an eminence near the city. Mr Coxe mentions an admirable police in this city for preventing riots, or for stopping the concourse of people in case of fires, which are very frequent and violent in those parts, where the houses are mostly of wood, and the streets are laid with timber. At the entrance of each street there is a chevaux-de frize gate, one end whereof turns upon a pivot, and the other rolls upon a wheel; near it is a centry-box in which a man is occasionally stationed. In times of riot or fire the centinel shuts the gate, and all passage is immediately stopped.

Among the public institutions of Moscow, the most remarkable is the Foundling Hospital, endowed in 1764 by the present empress, and supported by voluntary contributions and legacies, and other charitable gifts. In order to encourage donations, her majesty grants to all benefactors some valuable privileges, and a certain degree of rank in proportion to the extent of their liberality. Among the principal contributors must be mentioned a private merchant named *Dimidof*, a person of great wealth, who has expended in favour of this charity above L. 100,000. The hospital, which is situated in a very airy part of the town upon a gentle ascent near the river Moskva, is an immense pile of building of a quadrangular shape, part of which was only finished when Mr Coxe (whose account we are transcribing) was at Moscow. It contained, at that time, 3000 foundlings; and, when the whole is completed, will receive 8000. The children are brought to the porter's lodge, and admitted without any recommendation. The rooms are lofty and large; the dormitories, which are separate from the work rooms, are very airy, and the beds are not crowded: each foundling, even each infant, has a separate bed; the bedsteads are of iron; the sheets are changed every week, and the linen three times a-week. Through the whole rooms the greatest neatness prevails; even the nurseries being uncommonly clean, and without any unwholesome smells. No cradles are allowed, and rocking is particularly forbidden. The infants are not swaddled according to the custom of the country, but loosely dressed.—The foundlings are divided into separate classes, according to their respective ages. The children remain two years in the nursery, when they are admitted into the lowest class; the boys and girls continue together until they are seven years of age, at which time they are separated. They all learn to read, write, and cast accounts. The boys are taught to knit; they occasionally card hemp, flax, and wool, and work in the different manufactures. The girls learn to knit, net, and all kinds of needle-work; they spin and weave lace; they are employed in cookery, baking, and house-work of all sorts. At the age of 14 the foundlings enter into the first class; when they have the liberty of choosing any

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any particular branch of trade; and for this purpose there are different species of manufactures established in the hospital, of which the principal are embroidery, silk stockings, ribbands, lace, gloves, buttons, and cabinet work. A separate room is appropriated to each trade. Some boys and girls are instructed in the French and German languages, and a few boys in the Latin tongue; others learn music, drawing, and dancing. About the age of 20, the foundlings receive a sum of money, and several other advantages, which enable them to follow their trade in any part of the empire; a very considerable privilege in Russia, where the peasants are slaves, and cannot leave their village without the permission of their master.—The girls and boys eat separately. The dining rooms, which are upon the ground-floor, are large and vaulted, and distinct from their work-rooms. The first class sit at table; the rest stand: the little children are attended by servants; but those of the first or second class alternately wait upon each other. Their victuals are of the most wholesome and nourishing kinds. Each foundling has a napkin, pewter plate, a knife, fork, and spoon: the napkin and table-cloth are clean three times in the week. They rise at six, dine at eleven, and sup at six. The little children have bread at seven and at four. When they are not employed in their necessary occupations, the utmost freedom is allowed, and they are encouraged to be as much in the air as possible.

MOSELLE, a river of Germany, which rises in the mountains of Vauge in Lorraine, and, running thro' that duchy and the electorate of Triers, falls into the Rhine at Coblenz.

MOSES, the son of Amram and Jochebed, was born in the year 1571 before Christ. Pharaoh king of Egypt, perceiving that the Hebrews were become a formidable nation, issued forth an edict commanding all the male children to be put to death. Jochebed the mother of Moses, having, to avoid this cruel edict, concealed her son for three months, at length made an ark or basket of bulrushes, daubed it with pitch, laid the child in it, and exposed him on the banks of the Nile. Thermuthis the king's daughter, who happened to be walking by the river's side, perceived the floating cradle, commanded it to be brought to her, and, struck with the beauty of the child, determined to preserve his life. In three years afterwards the princess adopted him for her own son, called his name *Moses*, and caused him be diligently instructed in all the learning of the Egyptians. But his father and mother, to whom he was restored by a fortunate accident, were at still greater pains to teach him the history and religion of his fathers. Many things are related by historians concerning the first period of Moses's life, which are not to be found in the Old Testament. According to Josephus and Eusebius, he made war on the Ethiopians, and completely defeated them. They add, that the city Saba, in which the enemy had been forced to take refuge, was betrayed into his hands by the king's daughter, who became deeply enamoured of him, when she beheld from the top of the walls his valorous exploits at the head of the Egyptian army. But as the truth of this expedition is more than doubtful, we shall therefore confine ourselves to the narrative of sacred writ, which com-

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mences at the fortieth year of Moses's life. He then left the court of Pharaoh, and went to visit his countrymen the Hebrews, who groaned under the ill-usage and oppression of their unfeeling masters. Having perceived an Egyptian smiting an Hebrew, he slew the Egyptian, and buried him in the sand. But he was obliged, in consequence of this murder, to fly into the land of Midian, where he married Zipporah, daughter of the priest Jethro, by whom he had two sons, Gershom and Eliezar. Here he lived 40 years; during which time his employment was to tend the flocks of his father-in-law. Having one day led his flock towards Mount Horeb, God appeared to him in the midst of a bush which burned with fire but was not consumed, and commanded him to go and deliver his brethren from their bondage. Moses at first refused to go; but was at length prevailed on by two miracles which the Almighty wrought for his conviction. Upon his return to Egypt, he, together with his brother Aaron, went to the court of Pharaoh, and told him that God commanded him to let the Hebrews go to offer sacrifices in the desert of Arabia. But the impious monarch disregarded this command, and caused the labour of the Israelites to be doubled. The messengers of the Almighty again returned to the king, and wrought a miracle in his sight, that they might move his heart, and induce him to let the people depart. Aaron having cast down his miraculous rod, it was immediately converted into a serpent: but the same thing being performed by the magicians, the king's heart was hardened more and more; and his obstinacy at last drew down the judgments of the Almighty on his kingdom, which was afflicted with ten dreadful plagues. The first was the changing of the waters of the Nile and of all the rivers into blood, so that the Egyptians died of thirst. In consequence of the second plague, the land was covered with innumerable swarms of frogs, which entered even into Pharaoh's palace. By the third plague, the dust was converted into lice, which cruelly tormented both man and beast. The fourth plague was a multitude of destructive flies which spread throughout Egypt, and infested the whole country. The fifth was a sudden pestilence, which destroyed all the cattle of the Egyptians, without injuring those of the Israelites. The sixth produced numberless ulcers and fiery bites upon man and upon beast. The seventh was a dreadful storm of hail, accompanied with thunder and lightning, which destroyed every thing that was in the field, whether man or beast, and spared only the land of Goshen, where the children of Israel dwelt. By the eighth plague swarms of locusts were brought into the country, which devoured every green herb, the fruit of the trees and the produce of the harvest. By the ninth plague thick darkness covered all the land of Egypt, except the dwellings of the children of Israel. The tenth and last plague was the death of the first-born in Egypt, who were all in one night cut off by the destroying angel, from the first-born of the king to the first-born of the slaves and of the cattle. This dreadful calamity moved the heart of the hardened Pharaoh, and he at length consented to allow the people of Israel to depart from his kingdom.

Profane authors who have spoken of Moses, seem to have been in part acquainted with these mighty wonders.

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wonders. That he performed miracles, must have been allowed by many, by whom he was considered as a famous magician; and he could scarcely appear in any other light to men who did not acknowledge him for the messenger of the Almighty. Both Diodorus and Herodotus mention the distressed state to which Egypt was reduced by these terrible calamities. The Hebrews, amounting to the number of 600,000 men, without reckoning women and children, left Egypt on the 15th day of the month Nisan, which, in memory of this deliverance, was thenceforth reckoned the first month of their year. Scarcely had they reached the shore of the Red Sea when Pharaoh with a powerful army set out in pursuit of them. On this occasion Moses stretched forth his rod upon the sea; and the waters thereof being divided, remained suspended on both sides till the Hebrews passed through dry-footed. —The Egyptians determined to follow the same course; but God caused a violent wind to blow, which brought back the waters to their bed, and the whole army of Pharaoh perished in the waves.

After the miraculous passage of the Red Sea, the army proceeded towards Mount Sinai, and arrived at Marah, where the waters were bitter; but Moses, by casting a tree into them, rendered them fit for drinking. Their tenth encampment was at Rephidim; where Moses drew water from the rock in Horeb, by smiting it with his rod. Here likewise Amalek attacked Israel. While Joshua fought against the Amalekites, Moses stood on the top of a hill, and lifted up his hands; in consequence of which the Israelites prevailed, and cut their enemies in pieces. They at length arrived at the foot of Mount Sinai on the third day of the ninth month after their departure from Egypt. Moses having ascended several times into the Mount, received the law from the hand of God himself in the midst of thunders and lightnings, and concluded the famous covenant betwixt the Lord and the children of Israel. When he descended from Sinai, he found that the people had fallen into the idolatrous worship of the golden calf. The messenger of God, shocked at such ingratitude, broke in pieces the tables of the law which he carried in his hands, and put 23,000 of the transgressors to the sword. He afterwards reascended into the mountain, and there obtained new tables of stone on which the law was inscribed. When Moses descended, his face shone so that the Israelites dared not to come nigh unto him, and he was obliged to cover it with a veil. The Israelites were here employed in constructing the tabernacle according to a pattern shown them by God. It was erected and consecrated at the foot of the Mount Sinai on the first day of the first month of the second year after their departure from Egypt; and it served the Israelites instead of a temple till the time of Solomon, who built a house for the God of his fathers after a model shown him by David.

Moses having dedicated the tabernacle, he consecrated Aaron and his sons to be its ministers, and appointed the Levites to its service. He likewise gave various commandments concerning the worship of God and the political government of the Jews. This was a *theocracy* in the full extent of the word. God himself governed them immediately by means of his ser-

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vant Moses, whom he had chosen to be the interpreter of his will to the people; and he required all the honours belonging to their king to be paid unto himself. He dwelt in his tabernacle, which was situated in the middle of the camp, like a monarch in his palace. He gave answers to those who consulted him, and himself denounced punishments against the transgressors of his laws. This properly was the time of the theocracy, taken in its full extent; for God was not only considered as the divinity who was the object of their religious worship, but as the sovereign to whom the honours of supreme majesty were paid. The case was nearly the same under Joshua; who, being filled with the spirit of Moses, undertook nothing without consulting God. Every measure, both of the leader and of the people, was regulated by the direction of the Almighty, who rewarded their fidelity and obedience by a series of miracles, victories, and successes. After Moses had regulated every thing regarding the civil administration, and the marching of the troops, he led the Israelites to the confines of Canaan, to the foot of Mount Nebo. Here the Lord commanded him to ascend into the mountain; whence he showed him the promised land, whereinto he was not permitted to enter. He immediately after yielded up the ghost, without sickness or pain, in the 120th year of his age, and 1451 years before Jesus Christ.

Moses is incontestably the author of the first five books of the Old Testament, which go by the name of the *Pentateuch*; and which are acknowledged to be inspired, by the Jews and by Christians of every persuasion. Some, however, have denied that Moses was the author of these books; and have founded their opinion on this, that he always speaks of himself in the third person. But this manner of writing is by no means peculiar to Moses: it occurs also in several ancient historians; such as Xenophon, Cæsar, Josephus, &c. who, possessed of more modesty or good sense than some modern historians, whose egotism is altogether disgusting, have not like them left to posterity a spectacle of ridiculous vanity and self-conceit. After all, it is proper to observe, that profane authors have related many falsehoods and absurdities concerning Moses, and concerning the origin and the religion of the Jews, with which they were but little acquainted. Plutarch, in his book concerning Isis and Osiris, says, that Judæus and Hierosolymus were brothers, and descended from Typhon; and that the former gave his name to the country and its inhabitants, and the latter to the capital city. Others say that they came from Mount Ida in Phrygia. Strabo is the only author who speaks any thing like reason and truth concerning them; tho' he too says that they were descended from the Egyptians, and considers Moses their legislator as an Egyptian priest. He acknowledges, however, that they were a people strictly just and sincerely religious. Other authors by whom they are mentioned, seem not to have had the smallest acquaintance either with their laws or their worship. They frequently confound them with the Christians, as is the case with Juvenal, Tacitus, and Quintilian.

MOSHEIM (John Laurence), an illustrious German divine, was born in 1695, of a noble family, which might seem to open to his ambition a fair path to civil promotion; but his zeal for the interests of religion,

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Mosheim.

Moskito.

religion, his thirst after knowledge, and particularly his taste for sacred literature, induced him to consecrate his talents to the service of the church. The German universities loaded him with literary honours; the king of Denmark invited him to settle at Copenhagen; the duke of Brunswick called him thence to Helmstadt, where he filled the academical chair of divinity; was honoured with the character of ecclesiastical counsellor to the court; and presided over the seminaries of learning in the duchy of Wolfenbüttele and the principality of Blackenburgh. When a design was formed of giving an uncommon degree of lustre to the university of Gottingen, by filling it with men of the first rank in letters, Dr Mosheim was deemed worthy to appear at the head of it, in quality of chancellor; and here he died, universally lamented, in 1755. In depth of judgment, in extent of learning, in purity of taste, in the powers of eloquence, and in a laborious application to all the various branches of erudition and philosophy, he had certainly very few superiors. His Latin translation of Cudworth's Intellectual System, enriched with large annotations, discovered a profound acquaintance with ancient learning and philosophy. His illustrations of the Scriptures, his labours in defence of Christianity, and the light he cast upon religion and philosophy, appear in many volumes of sacred and profane literature; and his Ecclesiastical History, from the birth of Christ to the beginning of the present century, is unquestionably the best that is extant. This work, written in Latin, has been translated into English, and accompanied with notes and chronological tables by Archibald Maclaine, D. D. and from this translator's preface to the second edition, 1758, in 5 vols 8vo, this short account is taken.

MOSKITO-COUNTRY, is situated in North America, between 85 and 88 degrees of west longitude, and between 13 and 15 degrees of north latitude; having the north sea on the north and east, Nicaragua on the south, and Honduras on the west; and indeed the Spaniards esteem it a part of the principality of Honduras, though they have no colonies in the Moskito country. When the Spaniards first invaded this part of Mexico, they massacred the greatest part of the natives, which gave those that escaped into the inaccessible part of the country an insuperable aversion to them; and they have always appeared ready to join any Europeans that come upon their coasts against the Spaniards, and particularly the English, who frequently come hither; and the Moskito men being excellent marksmen, the English employ them in striking the maratee fish, &c. and many of the Moskito Indians come to Jamaica, and sail with the English in their voyages.

These people are so situated between morasses and inaccessible mountains, and a coast full of rocks and shoals, that no attempts against them by the Spaniards, whom they mortally hate, could ever succeed. Nevertheless, they are a mild inoffensive people, of great morality and virtue, and will never trust a man who has once deceived them. They have so great a veneration towards the English, that they have spontaneously put themselves and their lands under the protection and dominion of the crown of England.

This was first done when the duke of Albemarle was governor of Jamaica, and the king of the Moskitos received a commission from his grace, under the seal of that island; since which time they have not only been steady in their alliance with the English, but warm in their affections, and very useful to them on many occasions.

When their king dies, the male heir goes to Jamaica, to certify that he is next in blood, and receives a commission in form from the governor of Jamaica to be king of the Moskitos, till which he is not acknowledged as such by his countrymen. So fond are these people of every thing that is English, that the common people are proud of every Christian or surname given them by our seamen, who honour their chief men with the titles of some of our nobility.

MOSQUE, a temple or place of religious worship among the Mahometans.

All mosques are square buildings, generally constructed of stone. Before the chief gate there is a square court paved with white marble; and low galleries round it, whose roof is supported by marble pillars. In these galleries the Turks wash themselves before they go into the mosque. In each mosque there is a great number of lamps; and between these hang many crystal rings, ostriches eggs, and other curiosities, which, when the lamps are lighted, make a fine show. As it is not lawful to enter the mosque with stockings or shoes on, the pavements are covered with pieces of stuff sewed together, each being wide enough to hold a row of men kneeling, sitting, or prostrate. The women are not allowed to enter the mosque, but stay in the porches without. About every mosque there are six high towers, called *minarets*, each of which has three little open galleries one above another: these towers, as well as the mosques, are covered with lead, and adorned with gilding and other ornaments; and from thence, instead of a bell, the people are called to prayers by certain officers appointed for that purpose. Most of the mosques have a kind of hospital belonging to them, in which travellers of what religion soever are entertained three days. Each mosque has also a place called *tarbe*, which is the burying-place of its founders; within which is a tomb six or seven feet long, covered with green velvet or satin; at the ends of which are two tapers, and round it several seats for those who read the koran and pray for the souls of the deceased.

MOSS (Dr Robert), dean of Ely, was eldest son of Mr Robert Moss, a gentleman in good circumstances; and was born at Gillingham in Norfolk in 1666. He was bred at Benet-college, Cambridge; and acquired great reputation both as a disputant and a preacher. He became preacher to the society of Gray's-inn, London, in 1698; and assistant preacher to Dr Wake at St James's, Westminster, 1699. He was sworn chaplain in three succeeding reigns, to King William, Queen Anne, and George I. and being one of the chaplains in waiting when Queen Anne visited the university of Cambridge, April 5. 1705, he was then created D. D. In 1708 he was invited by the parishioners of St Lawrence Jewry, on the resignation of dean Stanhope, to accept of their Tuesday lecture, which he held till 1727, and then resigned it on account

Mosque,
Mosa.

Moss. count of his growing infirmities. In 1712, on the death of Dr Roderick, he was nominated by the queen to the deanry of Ely, which was the highest, but not the last, promotion he obtained in the church; for in 1714 he was collated, by Robinson bishop of London, to Glifton, a small rectory on the eastern side of Hertfordshire. The gout deprived him of the use of his limbs for some of the last years of his life; and he died March 26. 1729, in his 63d year; and was buried in the presbytery of his own cathedral, under a plain stone with a simple inscription. His character may be seen in the preface to the eight volumes of his Sermons, which has usually been attributed to Dr Snape, the editor of the sermons; but the credit of it has lately been transferred to Dr Zachary Grey. Dean Moss is also supposed to have been the author of a pamphlet printed in 1717, intitled, "The report vindicated from misreports: being a defence of my lords the bishops, as well as the clergy of the lower house of convocation; in a letter from a member of that house to the prolocutor concerning their late consultations about the bishop of Bangor's writings." He wrote also some poems, both Latin and English.

MOSS, or MOSSES, in botany. See MUSCI.

Moss on Trees, in gardening. The growth of large quantities of moss on any kind of tree is a distemper of very bad consequence to its increase, and much damages the fruit of the trees of our orchards.

The present remedy is the scraping it off from the body and large branches by means of a kind of wooden knife that will not hurt the bark, or with a piece of rough hair-cloth, which does very well after a soaking rain. But the most effectual cure is the taking away the cause. This is to be done by draining off all the superfluous moisture from about the roots of the trees, and may greatly be guarded against in the first planting of the trees, by not setting them too deep.

If trees stand too thick in a cold ground, they will always be covered with moss; and the best way to remedy the fault is to thin them. When the young branches of trees are covered with a long and shaggy moss, it will utterly ruin them; and there is no way to prevent it but to cut off the branches near the trunk, and even to take off the head of the tree if necessary; for it will sprout again: and if the cause be in the mean time removed by thinning the plantation, or draining the land and stirring the ground well, the young shoots will continue clear after this.

If the trees are covered with moss in consequence of the ground's being too dry, as this will happen from either extreme in the soil, then the proper remedy is the laying mud from the bottom of a pond or river pretty thick about the root, opening the ground to some distance and depth to let it in; this will not only cool it, and prevent its giving growth to any great quantity of moss, but it will also prevent the other great mischief which fruit-trees are liable to in dry grounds, which is the falling off of the fruit too early.

The mosses which cover the trunks of trees, as they always are freshest and most vigorous on the side which points to the north, if only produced on that, serve to preserve the trunk of the tree from the severity of the

north-winds, and direct the traveller in his way, by always plainly pointing out that part of the compass.

MOSS is also a name given by some to the boggy ground in many parts of England, otherwise called a *fen* and *bog*.

In many of these grounds, as well in England and Ireland as in other parts of the world, there are found vast numbers of trees standing with their stumps erect, and their roots piercing the ground in a natural posture as when growing. Many of those trees are broken or cut off near the roots, and lie along, and this usually in a north-east direction. People who have been willing to account for this, have usually resolved it into the effect of the deluge in the days of Noah; but this is a very wild conjecture, and is proved false by many unanswerable arguments. The waters of this deluge might indeed have washed together a great number of trees, and buried them under loads of earth; but then they would have lain irregularly and at random; whereas they all lie lengthwise from south-west to north-east, and the roots all stand in their natural perpendicular posture, as close as the roots of trees in a forest.

Beside, these trees are not all in their natural state, but many of them have the evident marks of human workmanship upon them, some being cut down with an ax, some split, and the wedges still remaining in them; some burnt in different parts, and some bored through with holes. These things are also proved to be of a later date than the deluge, by other matters found among them, such as utensils of ancient people, and coins of the Roman emperors.

It appears from the whole, that all the trees which we find in this fossil state, originally grew in the very places where we now find them, and have only been thrown down and buried there, not brought from elsewhere. It may appear indeed an objection to this opinion, that most of these fossil trees are of the fir-kind; and that Cæsar says expressly, that no firs grew in Britain in his time: but this is easily answered by observing, that these trees, though of the fir-kind, yet are not the species usually called the *fir*, but pitch-tree; and Cæsar has no where said that pitch-trees did not grow in England. Norway and Sweden yet abound with these trees; and there are at this time whole forests of them in many parts of Scotland, and a large number of them wild upon a hill at Wareton in Staffordshire to this day.

In Hatfield marsh, where such vast numbers of the fossil trees are now found, there has evidently once been a whole forest of them growing. The last of these was found alive, and growing in that place within 70 years last past, and cut down for some common use.

It is also objected by some to the system of the firs growing where they are found fossil, that these countries are all bogs and moors, whereas these sorts of trees grow only in mountainous places. But this is founded on an error; for though in Norway and Sweden, and some other cold countries, the fir kinds all grow upon barren and dry rocky mountains, yet in warmer places they are found to thrive as well on wet plains. Such are found plentifully in Pomerania, Livonia, and Courland, &c. and in the west parts of New

'Mofs.

England there are vast numbers of fine stately trees of them in low grounds. The whole truth seems to be, that these trees love a sandy soil; and such as is found at the bottoms of all the mosses where these trees are found fossil. The roots of the fir-kind are always found fixed in these; and those of oaks, where they are found fossil in this manner, are usually found fixed in clay: so that each kind of tree is always found rooted in the places where they stand in their proper soil; and there is no doubt to be made but that they originally grew there. When we have thus found that all the fossil trees we meet with once grew in the places where they are now buried, it is plain that in these places there were once noble forests, which have been destroyed at some time; and the question only remains how and by whom they were destroyed. This we have reason to believe, by the Roman coins found among them, was done by the people of that empire, and that at the time when they were established or establishing themselves here.

Their own historian tells us, that when their armies pursued the wild Britons, these people always sheltered themselves in the miry woods and low watery forests. Cæsar expressly says this; and observes, that Cassibelan and his Britons, after their defeat, passed the Thames, and fled into such low morasses and woods, that there was no pursuing them: and we find that the Silures secured themselves in the same manner when attacked by Ostorius and Agricola. The same thing is recorded of Venutius king of the Brigantes, who fled to secure himself into the boggy forests of the midland part of this kingdom: and Herodian expressly says, that in the time of the Romans pushing their conquests in these islands, it was the custom of the Britons to secure themselves in the thick forests which grew in their boggy and wet places, and when opportunity offered, to issue out thence and fall upon the Romans. The consequence of all this was the destroying all these forests; the Romans finding themselves so plagued with parties of the natives issuing out upon them at times from these forests, that they gave orders for the cutting down and destroying all the forests in Britain which grew on boggy and wet grounds. These orders were punctually executed; and to this it is owing that at this day we can hardly be brought to believe that such forests ever grew with us as are now found buried.

The Roman histories all join in telling us, that when Suetonius Paulinus conquered Anglesea, he ordered all the woods to be cut down there, in the manner of the Roman generals in England: and Galen tells us, that the Romans, after their conquest in Britain, kept their soldiers constantly employed in cutting down forests, draining of marshes, and paving of bogs. Not only the Roman soldiers were employed in this manner, but all the native Britons made captives in the wars were obliged to assist in it: and Dion Cassius tells us, that the emperor Severus lost no less than 50,000 men in a few years time in cutting down the woods and draining the bogs of this island. It is not to be wondered at, that such numbers executed the immense destruction which we find in these buried forests. One of the greatest subterranean treasures of wood is that near Hatfield; and it is easy to prove, that these people, to whom this havock is thus attri-

buted, were upon the spot where these trees now lie buried. The common road of the Romans out of the south into the north, was formerly from Lindum (Lincoln), to Segelochum (Little Burrow upon Trent), and from thence to Danum (Doncaster), where they kept a standing garrison of Crispinian horse. A little off on the east, and north-east of their road, between the two last named towns, lay the borders of the greatest forest, which swarmed with wild Britons, who were continually making their sallies out, and their retreats into it again, intercepting their provisions, taking and destroying their carriages, killing their allies and passengers, and disturbing their garrisons. This at length so exasperated the Romans, that they were determined to destroy it; and to do this safely and effectually, they marched against it with a great army, and encamped on a great moor not far from Finningly: this is evident from their fortifications yet remaining.

There is a small town in the neighbourhood called *Osterfield*; and as the termination *field* seems to have been given only in remembrance of battles fought near the towns whose names ended with it, it is not improbable that a battle was fought here between all the Britons who inhabited this forest and the Roman troops under Ostorius. The Romans slew many of the Britons, and drove the rest back into this forest, which at that time overspread all this low country. On this the conquerors taking advantage of a strong south-west wind, set fire to the pitch-trees, of which this forest was principally composed; and when the greater part of the trees were thus destroyed, the Roman soldiers and captive Britons cut down the remainder, except a few large ones which they left standing as remembrances of the destruction of the rest. These single trees, however, could not stand long against the winds, and these falling into the rivers which ran through the country, interrupted their currents; and the water then overspreading the level country, made one great lake, and gave origin to the mosses or moory bogs, which were afterwards formed there, by the workings of the waters, the precipitation of earthy matter from them, and the putrefaction of rotten boughs and branches of trees, and the vast increase of water-moss and other such plants which grow in prodigious abundance in all these sorts of places. Thus were these burnt and felled trees buried under a new-formed spongy and watery earth, and afterwards found on the draining and digging through this earth again.

Hence it is not strange that Roman weapons and Roman coins are found among these buried trees; and hence it is that among the buried trees some are found burnt, some chopped and hewn; and hence it is that the bodies of the trees all lie by their proper roots, and with their tops lying north-east, that is, in that direction in which a south-west wind would have blown them down: hence also it is, that some of the trees are found with their roots lying flat, these being not cut or burned down, but blown up by the roots afterwards when left single; and it is not wonderful, that such trees as these should have continued to grow even after their fall, and shoot up branches from their sides which might easily grow into high trees. Phil. Trans. N° 275.

By this system it is also easily explained why the moor

'Mofs.

Moss. moor soil in the country is in some places two or three yards thicker than in others, or higher than it was formerly, since the growing up of peat-earth or bog-ground is well known, and the soil added by overflowing of waters is not a little.

As the Romans were the destroyers of this great and noble forest, so they were probably also of the several other ancient forests; the ruins of which furnishes us with the bog-wood of Staffordshire, Lancashire, Yorkshire, and other counties. But as the Romans were not much in Wales, in the Isle of Man, or in Ireland, it is not to be supposed that forests cut down by these people gave origin to the fossil wood found there; but though they did not cut down these forests, others did; and the origin of the bog-wood is the same with them and with us. Holingshead informs us, that Edward I. being not able to get at the Welch because of their hiding themselves in boggy woods, gave orders at length that they should all be destroyed by fire and by the axe; and doubtless the roots and bodies of trees found in Pembrokeshire under ground, are the remains of the execution of this order. The fossil wood in the bogs of the island of Man is doubtless of the same origin, though we have not any accounts extant of the time or occasion of the forests there being destroyed; but as to the fossil trees of the bogs of Ireland, we are expressly told, that Henry II. when he conquered that country, ordered all the woods to be cut down that grew in the low parts of it, to secure his conquests, by cutting away the places of resort of rebels.

MOVING-MOSS. We have an account in the Philosophical Transactions of a moving moss near Churchtown in Lancashire, which greatly alarmed the neighbourhood as miraculous. The moss was observed to rise to a surprising height, and soon after sunk as much below the level, and moved slowly towards the south.

A very surprising instance of a moving moss is that of Solway in Scotland, which happened in the year 1771, after severe rains which had produced terrible inundations of the rivers in many places. For the better understanding of this event, we shall give the following description of the spot of ground where it happened. Along the side of the river Esk there is a vale, about a mile broad, less or more in different places. It is bounded on the south-east by the river Esk, and on the north-west by a steep bank 30 feet in height above the level of the vale. From the top of the bank the ground rises in an easy ascent for about a quarter of a mile, where it is terminated by the moss; which extends about two miles north and south, and about a mile and an half east and west, and is bounded on the north-west by the river Sark. It is probable that the solid ground from the top of the bank above the vale was continued in the same direction under the moss, before its eruption, for a considerable space; for the moss at the place where the eruption happened, was inclined towards the sloping ground. From the edge of the moss there was a gully or hollow, called by the country people *the gap*, and said to be 30 yards deep where it entered the vale; down which ran a small rill of water, which was often dry in summer, having no supply but what filtered from the moss. The eruption happened at

the head of this gap, on Saturday November 16th 1771, about ten or eleven at night, when all the neighbouring rivers and brooks were prodigiously swelled by the rains. A large body of the moss was forced, partly by the great fall of rain, and partly by some springs below it, into a small beck or burn, which runs within a few yards of its border to the south-east. By the united pressure of the water behind it, and of this beck, which was then very high, it was carried down a narrow glen between two banks about 300 feet high, into a wide and spacious plain, over part of which it spread with great rapidity. The moss continued for some time to send off considerable quantities; which, being borne along by the torrent on the back of the first great body, kept it for many hours in perpetual motion, and drove it still farther on. This night at least 400 acres of fine arable land were covered with moss from 3 to 12 or 15 feet deep. Several houses were destroyed, a good deal of corn lost, &c. but all the inhabitants escaped. When the waters subsided, the moss also ceased to flow; but two pretty considerable streams continued to run from the heart of it, and carried off some pieces of mossy matter to the place where it burst. There they joined the beck already mentioned; which, with this addition, resumed its former channel; and, with a little assistance from the people of the neighbourhood, made its way to the Esk, through the midst of that great body of moss which obstructed its course. Thus, in a great measure drained, the new moss fell several feet, when the fair weather came in the end of November, and settled in a firmer and more solid body on the lands it had over-run. By this inundation about 800 acres of arable ground were overflowed before the moss stopped, and the habitations of 27 families destroyed. Tradition has preserved the memory of a similar inundation in Monteith in Scotland. A moss there altered its course in one night, and covered a great extent of ground.

MOSS of KINCARDINE: A remarkable tract of ground in the shire of Perth in Scotland, which deserves particular notice, not merely as a topographical curiosity, or as a subject of natural history; but for the information, equally uncommon and important, which it affords, respecting agricultural improvement, and the promotion of industry and population.

The moss of Kincardine is situated in the parish of the same name, comprehended between the rivers Forth and Teith, and in that district of Perthshire called *Monteith*. The moss begins about a mile above the confluence of these rivers; from thence it extends in length about four miles, and from one to two in breadth; and before the commencement of the operations (an account of which is to be given), comprehended near 2000 Scotch acres, of which about 1500 belong to the estate of Blair Drummond, the property of Lord Kames by his marriage with Mrs Drummond of Blair Drummond.

As mosses are extremely various in their nature; before entering upon the improvements made in Kincardine moss, it will be proper to give a short description of that moss, and of the subjacent soil which is the object of those improvements.

The moss lies upon a field of clay, which is a continuation of those rich, extensive flats in the neighbourhood

Moss.

Moss.

bourhood of Falkirk and Stirling, distinguished by the name of *carfes*. This clay, which is one uniform homogeneous mass sinking to a great depth, is found near the surface, consists of different colours, and is disposed in layers. The uppermost is grey; the next is reddish; and the lowest, which is the most fertile, is blue. Through the whole mass not a pebble is to be found. The only extraneous bodies it contains are sea-shells, which occur in all the varieties peculiar to the eastern coast of Scotland. They are disposed sometimes in beds, sometimes scattered irregularly at different depths. By attending to these circumstances, it cannot be doubted that the sea has been the means of the whole accumulation, and that it was carried on in a gradual manner by the ordinary ebb and flow of the tide. Upon any other supposition, why should there not have been a congeries of all the different materials that compose the surface of the surrounding heights? But to whatever cause the origin of this accumulation may be ascribed, certain it is that no soil whatever is more favourable to vegetation, or carries more abundant crops of every kind.

The surface of the clay, which, upon the retreat of the sea, had been left in an almost level plane, is every where thickly covered with trees, chiefly oak and birch, many of them of a great size. These trees seem to have been the first remarkable produce of the carse; and it is probable they were propagated by dissemination from the surrounding eminences. They are found lying in all directions beside their roots, which still continue firm in the ground in their natural position; and from impressions still visible, it is evident they have been cut with an axe or some similar instrument. For the cutting of wood, the two common purposes are, either to apply it to its proper use, or that the ground it occupies may be cultivated. In the present case, however, neither of these ends had been proposed, since the trees, by being left just as they were cut, were not only entirely lost, but the ground was rendered totally unfit for cultivation. Hence it is evident, that the downfall of this wood must be ascribed to some more extraordinary cause; and to none more probably than to that expedient, which, as we learn from Dion Cassius and other historians, the Romans put so extensively in practice to dislodge from their forests the ancient inhabitants of the British islands.

This hypothesis acquires no small degree of force from a circumstance that occurred in May 1768, when a large round vessel of thin brass and curious workmanship, 25 inches in diameter and 16 inches in height, was discovered upon the surface of the clay buried under the moss. This vessel, found upon the estate of John Ramsay, Esq; of Ochertyre, was by that gentleman presented to the Antiquarian Society of Edinburgh; in whose museum it remains deposited for preservation. And in a list of the various donations presented to that society, published by them in 1782, it is there denominated a *Roman camp-kettle*.

Between the clay and the moss is found a stratum nine inches thick, partly dark brown and partly of a colour approaching to black. This is a vegetable mould, accumulated probably by the plants that covered the ground previous to the growth of the wood, and by leaves from the trees thereafter. The difference of colour must be owing to a difference in the vegetable

substances that compose it. The brown mould is highly fertile; the other, especially in a dry season, is very unproductive. The crop that had occupied this mould when the trees were felled is found still entire. It consists chiefly of heath; but several other smaller plants are also very distinguishable.

Immediately above this stratum lies the moss, to the height, upon an average, of seven feet. It is composed of different vegetables arranged in three distinct strata. Of these the first is three feet thick. It is black and heavy, and preferable to the others for the purpose of fuel. It consists of bent-grass (*agrostis*), which seems to have grown up luxuriantly among the trees after they were felled. The second stratum also is three feet thick. It is composed of various kinds of mosses, but principally of bog-moss (*sphagnum*). It is of a fallow or iron colour, and remarkably elastic. It is commonly called *white-peat*; and for fuel is considered as much inferior to that above mentioned. The third stratum is composed of heath and a little bent-grass, but chiefly of the deciduous parts of the former. It is about a foot thick, and black.

Three strata of different vegetables lying above each other, the limits of each distinctly marked, and each distinguished by a different colour, is certainly a curious natural phenomenon.

An inquiry will here occur, What has occasioned this succession in the vegetables of which the moss is composed?

Every vegetable has a particular soil, more or less moist, peculiarly adapted to its nature. Let a piece of ground be in a moist state, rushes will introduce themselves; drain the ground sufficiently, the rushes will disappear, and finer vegetables will succeed. It seems reasonable to account for the succession of the different plants that compose the moss on similar principles.

Let us imagine an extensive plain covered with trees lying in all directions, full of branches, and possibly loaded with leaves. This it is evident would produce a great stagnation of water, which, as the crops of bent-grass accumulated, would still increase: and the probability is, that at length it had so increased, as to be the cause why the bent-grass and other congenial plants of the first stratum ceased to grow. But it is evident that a plant was to be found that could live in such a situation. Accordingly we see that bog-moss had established itself; a plant that loves even to swim in water.

When the accumulations of bent-grass and the mosses had, in process of time, arisen to the height of six feet above the surrounding *carse* ground, the water that fell upon the surface had by that means an opportunity to discharge itself. It has accordingly formed many channels, which are often three feet deep; and the intermediate surface being wholly turned into little hillocks has become dry and firm. By this means it became unfit for mosses, and heath succeeded.

Such seems to have been the process in the formation of what is now called a *moss*.

By far the greatest part of the moss in question is, upon an average, full seven feet deep, and has in all probability lain undisturbed since its formation: this is called the *High Moss*. The remainder, called the *Low Moss*, lies to a considerable breadth around the extremities of the high; and is, upon an average, not above three feet in depth,

Moss.

Moss.

depth, to which it has been reduced by the digging of peats. These are formed of that stratum of the moss only that lies four feet below the surface and downwards; the rest is improper for the purpose, and is thrown aside.

Before the introduction of the plan which is now pursued, two methods chiefly were employed to gain land from the moss. 1st, The surrounding farmers marked off yearly a portion of the Low Moss next to their arable land, about 15 feet broad. This they removed with carts and spread upon their fields, some acres of which they for that end left unsown. Here it lay till May or June; when, being thoroughly dry, it was burnt to ashes to serve as a manure. By this means they added to their farms about half a rood of land yearly. But this plan proved unsuccessful; for by the repeated application of these ashes, the soil was rendered so loose that the crops generally failed. 2dly, Many farmers were wont to *trench down* the low moss, and to cover it *furrow deep* with clay taken out of the trench. This, though commendable as an attempt to improve, proved likewise an unavailing method; because in a dry season the superficial covering of clay retains so little moisture that the crop commonly fails.

It has been attempted to cover the moss with clay brought from the adjacent grounds. But what from the necessary impoverishment of the ground from which the clay was carried, and the softness of the moss, this was soon found to be impracticable.

Draining has also been proposed as another mode of improvement; and it must be acknowledged, that, by means of draining, many mosses have been converted both into arable and meadow grounds, which in the end became interesting improvements. But in a moss, such as that of Kincardine, this method would be ineffectual; as for several feet deep it is of such a nature, that upon being dry and divided into parts, it would blow with the wind like chaff; and when thrown aside in the operation of digging peats, it lies for years without producing a single vegetable, except only a few plants of sorrel.

Hence it is evident, that all attempts to *improve* this moss must ever prove abortive; and that the object to be had in view is the acquisition of the valuable soil lying underneath; to which end nothing less is requisite than the total abolition of the moss.

By the methods above described from 100 to 200 acres of moss had been removed. When the present plan was introduced, there still remained covered with moss from 1300 to 1400 acres of carse clay—a treasure for which it must be ever interesting to dig.

In the year 1766 Lord Kames entered into possession of the estate of Blair Drummond. Long before that period he was well acquainted with the moss, and often lamented that no attempt had ever been made to turn it to advantage. Many different plans were now proposed; at length it was resolved to attempt, by means of water as the most powerful agent, entirely to sweep off the whole body of moss.

That moss might be floated in water, was abundantly obvious; but to find water in sufficient quantity was difficult, the only stream at hand being employed to turn a corn-mill. Convinced of the superior consequence of dedicating this stream to the purpose of floating off the moss, Lord Kames having made an

agreement with the tenant who farmed the mill, and the tenants thirled consenting to pay the rent, he immediately threw down the mill, and applied the water to the above purpose.

In order to determine the best manner of conducting the operation, workmen were now employed for a considerable time upon the Low Moss both by the day and by the piece, to ascertain the expence for which a given quantity of moss could be removed. It was then agreed to operate at a certain rate per acre; and in this manner several acres were removed.

But this was to be a very expensive process. The ground gained might, indeed, be afterwards let to tenants; but every acre would require an expenditure from 12 l. to 15 l. before it could be ready for sowing; so that the acquisition of the whole, computing it at a medium to be 1350 acres, would sink a capital of nearly 20,000 l. Sterling.

One other method still remained; namely, to attempt letting portions of the moss, as it lay, for a term of years sufficient to indemnify tenants for the expences incurred in removing it. For some time both these plans were adopted; but several reasons made the latter preferable. 1. The quantity of water to be had was small; and being also uncertain, it was very inconvenient for an undertaker; neither were there any houses near the spot, which occasioned a great loss of time in going and coming: but when a man should live upon the spot, then he could be ready to seize every opportunity. 2. The moss was an useless waste. To let it to tenants would increase the population of the estate, and afford to a number of industrious people the means of making to themselves a comfortable livelihood.

In the mean time it was determined, till as many tenants should be got as could occupy the whole water, to carry on the work by means of undertakers.

But before proceeding farther, it will be necessary to describe the manner of applying water to the purpose of floating the moss.

A stream of water sufficient to turn a common corn-mill will carry off as much moss as 20 men can throw into it, provided they be stationed at the distance of 100 yards from each other. The first step is to make in the clay, along-side of the moss, a drain to convey the water: and for this operation the carse-clay below the moss is peculiarly favourable, being perfectly free from stones and all other extraneous substances, and at the same time, when moist, slippery as soap; so that not only is it easily dug, but its lubricity greatly facilitates the progress of the water when loaded with moss. The dimensions proper for the drain are found to be two feet for the breadth and the same for the depth. If smaller, it could not conveniently receive the spadefuls of moss; if larger, the water would escape, leaving the moss behind. The drain has an inclination of one foot in 100 yards: the more regularly this inclination is observed throughout, the less will the moss be liable to obstructions in its progress with the water. The drain being formed, the operator marks off to a convenient extent along-side of it a section of moss 10 feet broad; the greatest distance from which he can heave his spadeful into the drain. This he repeatedly does till the entire mass be removed down to the clay. He then digs a new drain at the foot of the

Moss.

Mofs.

the mofs-bank, turns the water into it, and proceeds as before, leaving the mofs to pursue its course into the river Forth, a receptacle equally convenient and capacious; upon the fortunate situation of which, happily forming for several miles the southern boundary of the estate, without the interposition of any neighbouring proprietor, depended the very existence of the whole operations.

When the mofs is entirely removed, the clay is found to be encumbered with the roots of different kinds of trees standing in it as they grew, often very large: their trunks also are frequently found lying beside them. All these the tenants remove often with great labour. In the course of their operations they purposely leave upon the clay a stratum of mofs six inches thick. This, in spring, when the season offers, they reduce to ashes, which in a great measure ensures the first crop. The ground thus cleared is turned over, where the dryness admits, with a plough, and, where too soft, with a spade. A month's exposure to the sun, wind, and frost, reduces the clay to a powder fitting it for the seed in March and April. A crop of oats is the first, which seldom fails of being plentiful, yielding from eight to ten bolls after one.

In the year 1767 an agreement was made with one tenant for a portion of the Low Mofs. This, as being the first step towards the intended plan, was then viewed as a considerable acquisition. The same terms agreed upon with this tenant have ever since been observed with all the rest. They are as follow:

The tenant holds eight acres of mofs by a tack of 38 years; he is allowed a proper quantity of timber, and two bolls of oatmeal to support him while employed in rearing a house; the first seven years he pays no rent; the eighth year he pays one merk Scots; the ninth year two merks; and so on with the addition of one merk yearly till the end of the first 19 years; during the last five years of which he also pays a hen yearly. Upon the commencement of the second 19 years, he begins to pay a yearly rent of 12s. for each acre of land cleared from mofs, and 2s. 6d. for each acre not cleared, also two hens yearly: A low rent indeed for so fine a soil; but no more than a proper reward for his laborious exertions in acquiring it.

In the year 1768 another tenant was settled. These two were tradesmen; to whom the preference was always given, as having this great advantage to recommend them, that even when deprived of water they need never want employment. The motives that induced these people to become settlers were, 1st, The prospect of an independent establishment for a number of years. 2^{dly}, The mofs afforded them great abundance of excellent fuel; to which was added the comfortable consideration, that, while busied in providing that necessary article, they had the double advantage of promoting, at the same time, the principal object of their settlement.

Notwithstanding these inducements, still settlers offered slowly; to which two circumstances chiefly contributed: 1st, The whole farmers surrounding the mofs threw every possible obstruction in their way. 2^{dly}, By people of all denominations the scheme was viewed as a chimerical project, and became a common topic of ridicule. The plan, however, supported itself; and in the year 1769 five more tenants agreed for eight

N^o 230.

acres each; and thus 56 acres of Low Mofs were disposed of. From the progress made by the first settlers, and the addition of these, the obloquy of becoming a mofs-tenant gradually became less regarded; so that in the year 1772 two more were added; in 1773, three; and in 1774, one; in all 13: which disposed of 104 acres; all the Low Mofs to which water could then be conveyed. As water is the main spring of the operation, every tenant, beside the attention necessary to his share of the principal stream, collected water by every possible means, making ditches round his portion of the mofs, and a reservoir therein to retain it till wanted.

The tenants in the Low Mofs having now begun to raise good crops, in the year 1774 several persons offered to take possessions in the High Mofs, upon condition that access to it should be rendered practicable. The High Mofs wanted many advantages that the Low possessed. To the Low Mofs, lying contiguous to the surrounding arable lands, the access was tolerably good; but from the arable lands the High Mofs was separated by 300 or 400 yards of the Low, which, even to a man, affords but indifferent footing, and to horses is altogether impracticable. The Low Mofs is in general only three feet deep; the High Mofs is from six to twelve feet in depth.

It will appear at first sight, that without a road of communication the High Mofs must for ever have proved unconquerable. Without delay, therefore, a road was opened to the breadth of twelve feet, for several hundred yards in length, by floating off the mofs down to the clay.

This being effected, and at the same time an opening given to admit water, in the year 1775 twelve tenants agreed for eight acres of high mofs each. In consideration of the greater depth of this part of the mofs, it was agreed, that during the first 19 years they should pay no rent; but for the second 19 years the terms of agreement were the same as those made with the tenants in the Low Mofs. To the above mentioned tenants every degree of encouragement was given; as upon their success depended, in a great measure, the disposal of the great quantity of mofs still remaining. But their success, however problematical, was such, that next year,

1776, 6 more took 8 acres each,

1777, 1

1778, 4

1779, 3

1780, 1

1781, 1

1782, 1

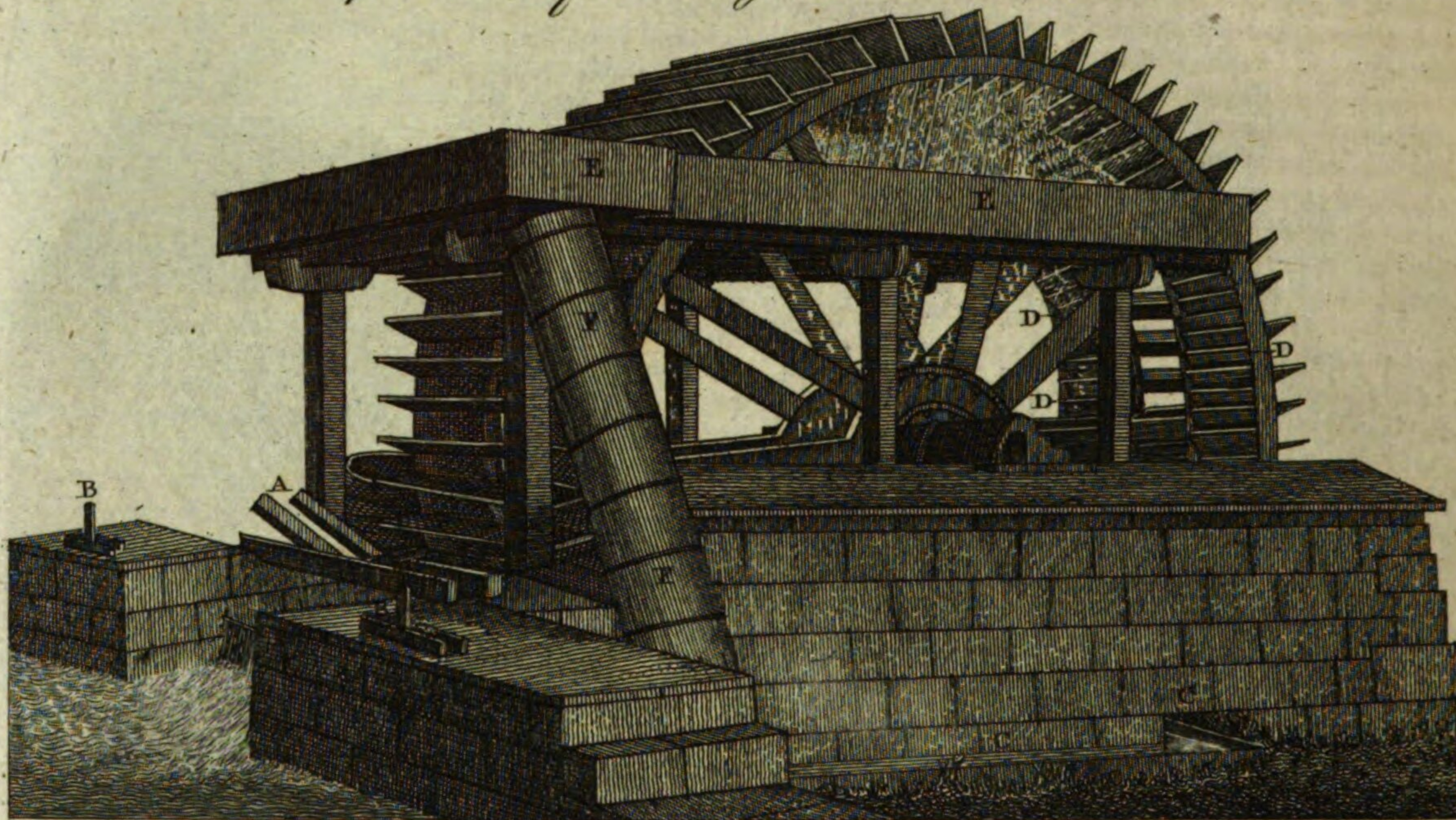
In all, including those upon the Low Mofs, 42 tenants, occupying 336 acres.

Though for some time the disposal of the High Mofs went but slowly on, it was not for want of tenants; but the number of operators was already sufficient for the quantity of water; to have added more would evidently have been imprudent.

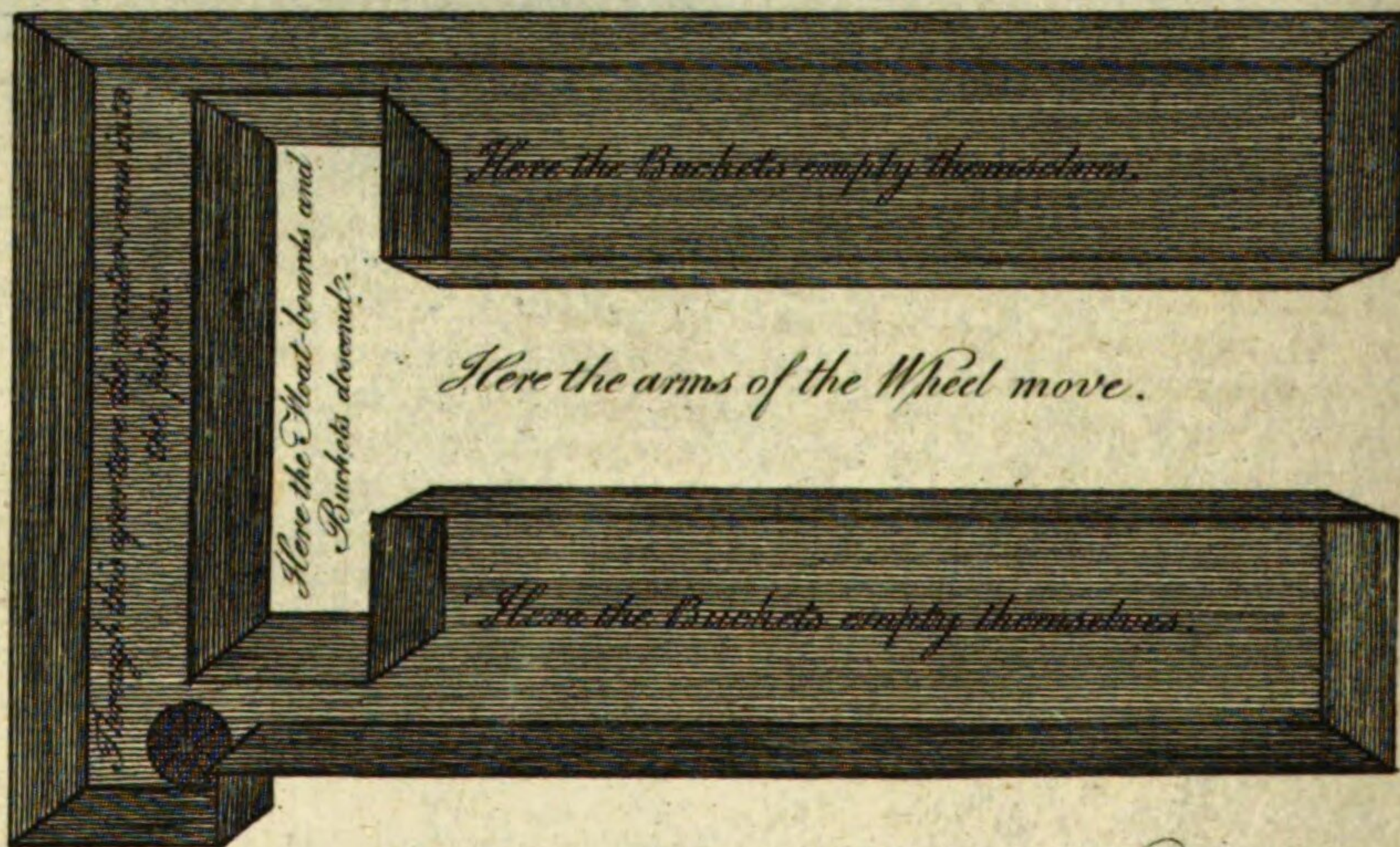
In the year 1783 Mr Drummond entered into possession of the estate of Blair-Drummond, and went fully into the plan adopted by his predecessor for subduing the mofs. At this time there still remained undisposed of about 1000 acres of High Mofs. As water was the great desideratum, it was determined,

Moss or Bog.
Sketch of the Wheel for raising Water at Blair Drummond.

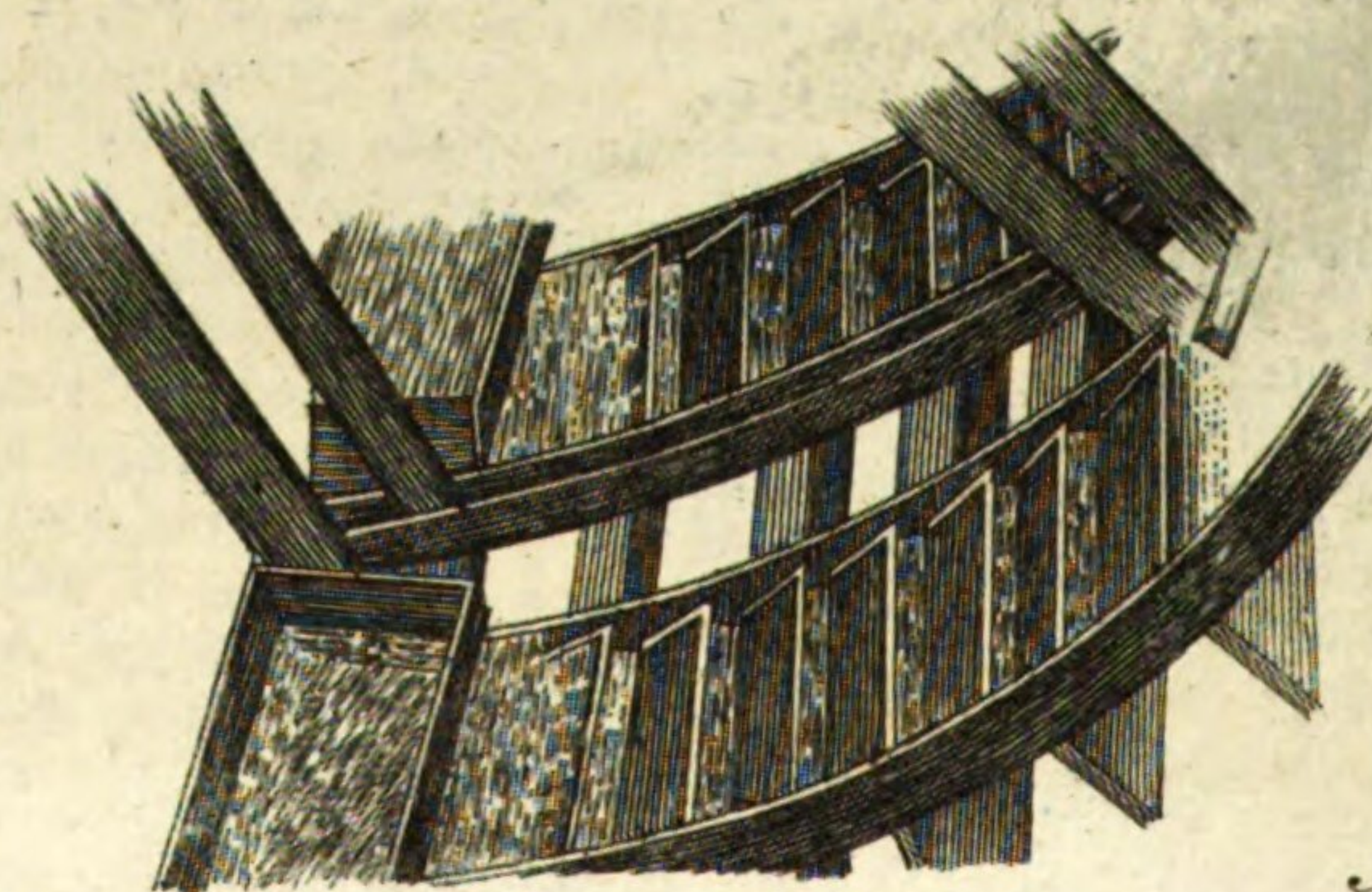
Plate CCCXVI.



Sketch of the Cistern as seen from above.



Sketch of the manner in which the water is filled from the Troughs into the Buckets.



At Bell Prin. Wat. Sculptor fecit.

Mofs.

that to obtain that necessary article neither pains nor expence should be wanting. Steps were accordingly taken to ascertain in what manner it might be procured to most advantage.

Meanwhile, to prepare for new tenants a second road parallel to the former, at the distance of half a mile, was immediately begun and cut, with what water could be got, down to the clay, 12 feet broad and 2670 yards long, quite across the mofs. This opening was previously necessary, that operators might get a drain formed in the clay to direct the water; and it was to remain as a road that was absolutely necessary, and which relieved settlers from an expence they were unable to support. These preparations, the progress of the former tenants, and the prospect of a farther supply of water, induced 10 more to take possessions in the year 1783; in the year 1784, 18 more took possessions; and in 1785 no fewer than 27;—in all, 55 tenants in three years, which disposed of 440 acres more of the High Mofs.

As the introduction of an additional stream to the mofs was to be a work both of nicety and expence, it was necessary to proceed with caution. For this reason several engineers were employed to make surveys and plans of the different modes by which it might be procured. In one point they all agreed, that the proper source for furnishing that supply was the river Teith; a large and copious stream that passes within a mile of the mofs: but various modes were proposed for effecting that purpose.

To carry a stream from the river by a cut or canal into the mofs was found to be impracticable; and Mr Whitworth (A) gave in a plan of a pumping machine, which he was of opinion would answer the purpose extremely well.

Soon after this Mr George Meikle of Alloa, a very skilful and ingenious mill wright, gave in a model of a wheel for raising water entirely of a new construction, of his own and his father's invention jointly. This machine is so exceedingly simple, and acts in a manner so easy, natural, and uniform, that a common observer is apt to undervalue the invention: But persons skilled in mechanics view machinery with a very different eye; for to them simplicity is the first recommendation a machine can possess. Accordingly, upon seeing the model set to work, Mr Whitworth, with that candour and liberality of mind that generally accompany genius and knowledge, not only gave it the greatest praise, but declared that, for the purpose required, it was superior to the machine recommended by himself, and advised it to be adopted without hesitation.

The better to explain this machine, two sketches are annexed, to the first of which the following letters refer. The explanation of the second will be found upon the sketch.

Plate
CCCXVI.

a. Sluice through which is admitted the water that moves the wheel.

b, b. Two sluices through which is admitted the water raised by the wheel.

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c, c. A part of one of two wooden troughs and an aperture in the wall, through which the above water is conveyed into the buckets. [The other trough is hid by two stone walls that support the wheel.]

d, d, d. Buckets, of which 80 are arranged on each side of the arms of the wheel = 160.

e, e, e. A cistern, into which the water raised by the buckets is discharged.

f, f, f. Wooden barrel-pipes, through which the water descends from the cistern underground, to avoid the high road from Stirling and the private approach to the house.

Sketch second contains a plan of the cistern, and exhibits the manner in which the water is filled into the buckets.

The diameter of the wheel to the extremities of the float-boards is 28 feet; the length of the float-boards, 10 feet. The wheel makes nearly four revolutions *per* minute; in which time it discharges into the cistern 40 hogsheds of water. But this is not all the wheel is capable of performing; for by several accurate trials by Messrs Whitworth and Meikle, in the result of which, though made separately, they perfectly agreed, it was found that the wheel was able to lift no less than 60 hogsheds *per* minute; but that the diameter of the pipes through which the water descends from the cistern would not admit a greater quantity than what they already receive.

To a person at all conversant in hydraulics, the resemblance of this to the Persian wheel must be obvious: and indeed it is probable, that from the Persian wheel the first idea of this machine was derived. But admitting this, still the superiority of the present wheel is, in most respects, so conspicuous, as to entitle it to little less praise than the first invention. For, 1st, In the Persian wheel, the buckets being all moveable, must be constantly going out of order: In this wheel they are all immoveable, consequently never can be out of order. 2dly, Instead of lifting the water from the bottom of the fall as in the Persian wheel, this wheel lifts it from the top of the fall, being from four to five feet higher; by which means some additional power is gained. 3dly, By means of the three sluices (*a*, and *b, b*, fig. 1.) in whatever situation the river may be, the quantity of the water to be raised is so nicely adjusted to that of the moving power, as constantly to preserve the wheel in a steady and equable motion. In short, as a regulator is to a watch, so are these sluices to this wheel, whose movements would otherwise be so various, as sometimes to carry the water clear over the cistern, sometimes to drop it entirely behind, but seldom so as fully to discharge the whole contents of the buckets into the cistern.

It is however but candid to remark, that this machine labours under a small defect, which did not escape the observation of Mr Whitworth; namely, that by raising the water about $3\frac{1}{2}$ feet higher than the cistern where it is ultimately delivered, a small degree of power is lost. To this indeed he proposed a remedy; but candidly confessed, that, as it would render the machine

3 D

some-

(A) This gentleman is superintendant of the London water-works, and an engineer of great reputation in England. He was several years employed in Scotland in completing the great canal.

Mofs.

somewhat more complex, and would also increase the friction, he thought it more advisable to keep it in its present state. At the same time he justly observed, that as the stream by which the wheel is moved is at all times copious and powerful, the small loss of power occasioned by the above circumstances was of little or no avail.

This stream is detached from the Teith at the place where that river approaches nearest to the mofs. The surface of the latter is about 15 feet higher than that of the former; the cistern is therefore placed 17 feet above the surface of the stream, so as to leave a declivity sufficient to deliver the water upon the surface of the mofs.

The pipes through which the water descends from the cistern are composed of wooden barrels hooped with iron 4 feet long and 18 inches in diameter within.

In these pipes, having been conveyed under ground for 354 yards from the cistern, the water at once emerges into an open aqueduct. This aqueduct, which was formed according to a plan by Mr Whitworth, is constructed wholly of earth or clay; and in order to keep the water on a level with the surface of the mofs, it is for nearly two-thirds of its course elevated from 8 to 10 feet above the level of the adjacent grounds; the base being 40 feet broad, the summit 18 feet, and the water-course 10 feet broad. It commences at the termination of the pipes; from whence extending above 1400 yards, it discharges the water into a canal formed for its reception on the surface of the mofs.

For raising the water to this height there were two reasons. 1st, That not only where it was delivered on the mofs, but even after being conveyed to the most distant corners, it might still retain sufficient power to transport the mofs to the river Forth. 2dly, That reservoirs of a sufficient height might be formed in the mofs to retain the water delivered during night.

In consequence of Mr Whitworth's advice, a contract was entered into with Mr Meikle in spring 1787; and by the end of October in that year, the wheel, pipes, and aqueduct, were all completely finished: and what, in so complex and extensive an undertaking, is by no means common, the different branches of the work were so completely executed, and so happily adjusted to each other, that upon trial the effect answered the most sanguine expectations. The total expence exceeded L. 1000 Sterling.

To induce the proprietor to embark in this undertaking, the mofs tenants had of their own accord previously come under a formal engagement to pay the interest of any sum that might be expended in procuring a supply of water. But he was determined they should not enjoy by halves the sweets of this long-wished-for acquisition. With a view, therefore, not only to reward their past industry, but to rouse them to future exertions, he at once set them free from their engagement; nor has any interest ever been demanded.

This new supply was a most acceptable boon to the mofs tenants.—In order to make an equitable distribution, the water raised through the day was allotted to one division of operators; that raised during the night to another. To retain the latter, a canal was formed, extending almost three miles through the centre of the mofs. From place to place along the sides

are inserted sluices to admit water to the reservoirs of the possessors; each sluice having an aperture proportioned to the number of operators to be supplied from the reservoir which it fills. For the water raised through the day no reservoirs are necessary; as it is immediately used by the division to which it is allotted.

This additional stream, though highly beneficial, yet is not more than sufficient to keep 40 men at constant work. But such a quantity as would give constant work is not necessary; the operators must be often employed in making and repairing their drains, grubbing up roots of trees, &c.; so that a quantity sufficient to give five or six hours work *per* day to the whole inhabitants is as much as would be wanted. But as the quantity procured was still insufficient for this purpose, a small stream that descended from the higher grounds was diverted from its course and brought into the mofs. From want of level this stream could not be delivered to the greatest advantage; namely, upon the surface of the mofs. Yet by making, at a considerable expence, a drain half a mile long, and a reservoir for the night-water, it was rendered of much importance. And during the whole winter months, as well as in summer, after every fall of rain, it keeps 15 persons fully employed.

In the year 1787 two more tenants agreed for eight acres each; in 1788, four; in 1789, eight; in 1790, four tenants, all agreed for the same number of acres.

The whole mofs was now disposed of, except that part called *Flow-mofs*, which comprehended about 400 acres. Here it is twice the usual breadth, so fluid that a pole may be thrust with one hand to the bottom; and the interior part, for near a mile broad, is three feet above the level of all the rest of the mofs. Hitherto the many and various difficulties that presented themselves had been overcome by perseverance and expence. But here the extraordinary elevation of the morafs, joined to its great fluidity, seemed to exclude all possibility of admitting a stream of water; and it was the general opinion that the mofs-operations had now arrived at their *ne plus ultra*, and that this morafs was doomed to remain a nuisance for ages to come.

But the proprietor had now advanced so far that he could not submit to retreat; and he considered himself as, in some measure, pledged to the country for the completion of this undertaking. To detail the various methods practised to introduce a stream of water into that morafs, would prove tedious. It is sufficient to say, that after a thousand unsuccessful efforts, attended with much trouble and considerable expence, the point at last was gained, and a stream of water was brought in, and carried fairly across the centre of the morafs.

The greatest obstacle was now indeed overcome; but still another remained of no small moment, namely, the discouragement given to settlers from the total impossibility of erecting habitations upon the surface of this morafs. To find a remedy for this evil was difficult. Happily a resource at last occurred. This was to bargain with a certain number of the old tenants whose habitations were nearest, to take leases of portions of the morafs. But as some additional aid was here necessary, it was agreed that L. 12 Sterling should be gradually advanced to each tenant till he should accomplish the clearing of an acre, for which he or his successor is bound to pay 12s. of yearly rent, equal

Mofs.

Moss. equal to five *per cent.* upon the sum advanced. When this point shall be gained, they are bound to dispose, as most agreeable to themselves, either of their old or of their new possession; for which, when once an acre is cleared, purchasers will not be wanting.

In consequence of the above arrangement, during the year 1791 no fewer than 35 of the old tenants agreed, upon the foresaid conditions, for eight acres each of the Flow-moss. Thus 1200 acres are now disposed of to 115 tenants. But when these 35 tenants shall each have cleared their acre, then, according to agreement, 35 additional tenants will speedily be acquired; and the moss will then contain in all 150 families.

To the leases already granted to the tenants in the High Moss, it is now determined to add a further period of 19 years (making in all 57 years), during which they are to pay one guinea per acre; a rent not greater than the land is worth even at present, but greatly below its probable value at that distant period. This, it is hoped, will prove to the tenants a sufficient incitement to continue their operations till their possessions are completely cleared from moss.

Having now gone through, in detail, the whole progress of the colony since its first settlement in the year 1767, it still remains to take a general view of the effects produced by that establishment.

For several years, at first, the water was used chiefly to carry off moss, in the forming of new roads, and preparing reservoirs; which considerably retarded the principal object of gaining land. Nevertheless there have been cleared full 300 acres of excellent land, producing wheat, barley, oats, and clover, yielding from six to twelve bolls after one.

From the nature of the undertaking, there is good reason to suppose that the operations will yearly advance with greater rapidity; especially as the greater number of the settlers have only of late begun to operate. Many, besides maintaining their families otherwise by occasional employments, have in the High Moss cleared in a year one rood of land; some have cleared two, some three roods, and in the Low Moss an acre.

It was a remark often made, even by persons of some observation, that by collecting together such a number of people, Kincardine would be over-stocked; and the consequence would be their becoming a burthen on the parish: for as the bulk of them were labourers not bred to any trade, and possessed of little stock, it was foreseen that, for some time, they could not afford to confine themselves solely to the moss, from which the return must be slow; but behaved, for immediate subsistence, to work for daily hire. Happily these predictions have proved entirely groundless; for such is the growing demand for hands in this country, that not only do the whole of these people find employment whenever they choose to look for it, but their wages have been yearly increasing from the time of their first establishment. In short, they have proved to the corner where they are set down a most useful nursery of labourers; and those very farmers who, at first, so strongly opposed their settlement, now fly to them as a sure resource for every purpose of agriculture. Still

Moss. they consider the moss-operations as their principal business; none pay them so well; and when they do leave it to earn a little money, they return with cheerfulness to their proper employment. Many of them already raise from 10 to 60 bolls of grain, and have no occasion to go off to other work; which will soon be the case with the whole. Their original stock, indeed, did not often exceed L.25, and some had not even L.10; but what was wanting in stock is compensated by industry.

Of the whole inhabitants full nine-tenths are Highlanders, from the neighbouring parishes of Callander, Balquhadder, &c.; a sober, frugal, and industrious people, who, inured to hardships in their own country, are peculiarly qualified to encounter so arduous an undertaking. From this circumstance, too, arises a very happy consequence; that wearing a different garb and speaking a different language from the people amongst whom they are settled, they consider themselves in a manner as one family transported to a foreign land. And hence upon all occasions of difficulty, they fly with alacrity to each others relief. Neither ought it to be forgotten, that, from their first settlement to the present day, not a single instance has occurred amongst them of theft, bad neighbourhood, or of any other misdemeanour, that required the interposition of the civil magistrate. Nor, however poor in circumstances, has any one of them ever stooped to solicit assistance from the funds of the parish appropriated to that purpose.

Though few of the tenants entered with a large stock, one only has been obliged to leave the moss from incapacity to proceed. Many indeed have spent their small stocks, and even run a little in debt: but in this case they have been permitted to sell their tacks upon the following conditions: 1st, That the purchaser shall be a good man; 2^d, That the seller shall take another possession. By this manœuvre a new inhabitant is gained; while the old one, relieved from debt, and aided by past experience, recommences his operations with double spirit upon a new possession. The monied man, again, has at once a house and a piece of ground; the want of which, chiefly, startled new beginners.

Some have even made a kind of trade of selling; in-somuch, that from the year 1774 to the present year 1792, no fewer than fifty sales have taken place, producing in all the sum of L.849 Sterling. This proved from time to time a most seasonable recruit to the colony, and gave new vigour and spirits to the whole.

The number of the settlers is productive of an excellent effect; that although some are generally absent, enough still remain to occupy the water constantly. In a favourable day there may be seen hundreds, men, women, and children, labouring with the utmost assiduity. The women declare they can make more by working at the moss than at their wheel; and such is the general attachment to that employment, that they have frequently been discovered working by moon-light.

Another happy consequence arising from their numbers is the great quantity of moss they consume for fuel. There are in all 115 families. Each family requires at an average 10 dargues (B) of peats yearly.

3 D 2

Each

(B) A dargue (or darg) of peats, is the quantity that one man can cast and two can wheel in a day to the field where they are spread out to dry.

Mofs.

Each darg uncovers a space equal to 10 square yards of clay: so that by casting peats, the mofs tenants gain yearly about 6 roods of land.

The advantage, too, of providing their fuel with so little trouble, is very great. They require yearly 1150 dargs of peats; which, as each darg when dried and stacked is valued at five shillings, are worth 287l. 10s. Sterling; a sum which otherwise must have been expended on the prime cost and carriage of coals. Many of them cast peats for sale; and L. 100 worth are yearly disposed of in the town of Stirling, the village of Down, &c.

Though mofs-work be laborious, it is at the same time amusing. The operator moves the mofs five feet only at a medium; and the water, like carts in other cases, carrying it off as fast as it is thrown in, excites him to activity. Still he must submit to be wet from morning to night. But habit reconciles him to this inconvenience; while his house and arable land fill his eye and cheer his mind. Nor is it found that the health of the inhabitants is in the smallest degree injured either by the nature of the work or the vicinity of the mofs.

The quantity of mofs that one man can move in a day is surprising; when he meets with no interruption, seldom less than 48 cubic yards, each weighing 90 stones. The weight, then, of mofs moved per day is no less than 4320 stones. A cubic yard is moved into the water, and of course carried into the river Forth for one farthing. It follows, that the expence of moving 48 cubic yards is one shilling. But the same quantity moved to the same distance by carts would cost 24 shillings. Hence the advantage derived from the possibility of floating mofs in water, and the great importance of having water for that purpose.

The mofs, when contrasted with the rich lands surrounding, appeared, especially before the improvements, a very dreary spot; one wide unvaried wild, totally unproductive, unfit even to furnish sustenance to any animal, except here and there a few wretched straggling sheep. Besides, it entirely cut off all connection betwixt the farms on either side; amongst which no intercourse was practicable but by a circuit of several miles.

The scene is already greatly changed. The following are the numbers of the inhabitants now residing in the mofs; also of their cows and horses, and of the acres gained by them from the mofs, together with their produce.

Men	-	-	-	115
Women	-	-	-	113
Boys	-	-	-	199
Girls	-	-	-	193

Total 620

Number of cows, at least,	-	115
Ditto of horses and carts,	-	34
Ditto of acres cleared from mofs,	-	300

The produce in bolls cannot be exactly ascertained; but, considering the goodness of the soil, may be fairly stated at 8 bolls per acre, *inde* 2400 bolls.

As oats are the staple commodity, the calculation shall be confined to that grain. According to the fiars of Stirlingshire, crop 1790 (the last crop for which

they have been struck), carse oats are valued at 14s. per boll. *Inde* 2400 bolls at 14s. is L. 1680.

Mofs.

A track of ground so considerable, formerly a nuisance to the country, thus converted into a fertile field, filled with inhabitants, comfortable and happy, cannot surely be surveyed with an eye of indifference by any person whose mind is at all susceptible of feeling or of public spirit.

An excellent gravelled road 20 feet wide and a mile and a half long, is now carried quite across the mofs. By this means, in the first place, a short and easy intercourse is established between two considerable parts of the estate, formerly as little connected as if separated by a lake or an arm of the sea. Secondly, the inhabitants of the Mofs, to whom, hitherto, all passage with carts or horses was impracticable for at least one half of the year, have now obtained the essential advantage of being able, with ease, to transport all their different commodities at every season of the year. This road was entirely formed by the hands of the mofs-tenants, and gravelled by their own carts and horses: a work which, it will not be doubted, they performed with much alacrity; when it is considered that, to the prospect of procuring a lasting and material benefit to themselves, there was joined the additional inducement of receiving an immediate supply of money, the whole being done at the proprietor's expence.

The possessions are laid off in the manner best fitted for the operations; and are divided by lanes running in straight lines parallel to each other. Parallel to these again the drains are carried; and this straight direction greatly facilitates the progress of the water with its load of mofs. Upon the bank of mofs fronting the lanes, the operation of floating is begun; and twenty or thirty people are sometimes seen heaving mofs into the same drain. That the water may be the more conveniently applied, the lanes include between them the breadth of two possessions only. The new houses are erected upon each side of these lanes at the distance of 100 yards from each other.

Before the formation of lanes and roads, and while yet no ground was cleared, the first settlers were obliged to erect their houses upon the surface of the mofs. Its softness denied all access to stones; which, at any rate, are at such a distance as would render them too expensive. Settlers, therefore, were obliged to construct their houses of other materials. Upon the Low Mofs there is found for this purpose great plenty of sod or turf, which accordingly the tenants use for the walls of their houses. For the rudeness of the fabric nature in some measure compensates, by overspreading the outside with a luxuriant coating of heath and other moorish plants, which has a very picturesque appearance.

But upon the High Mofs there is no sod to be found. There the tenant must go differently to work. Having chosen a proper situation for his house, he first digs four trenches down to the clay, so as to separate from the rest of the mofs a solid mass, containing an oblong, rectangular area, sufficiently large for his intended house. This being done, he then scoops out the middle of the mass, leaving on all sides the thickness of three feet for walls; over which he throws a roof,

Mofs.

roof, such as that by which other cottages are commonly covered.

Upon the softest parts of the mofs, even these walls cannot be obtained. In such places the houses are built with peat dug out of the mofs, and closely compressed together while in a humid state (c). It is necessary even to lay upon the surface a platform of boards to prevent the walls from sinking; which they have frequently done when that precaution was neglected. After all, to stamp with the foot will shake the whole fabric as well as the mofs for fifty yards around. This, at first, startled the people a good deal; but custom soon rendered it familiar.

The colonists have now made considerable advancement in rearing better habitations for their comfort and convenience. Their huts of turf are but temporary lodgings. As soon as they have cleared a little ground, they build houses of brick; when the proprietor a second time furnishes them with timber gratis. It has also been found necessary to relieve them entirely from the payment of the burdensome tax upon bricks; a tax which surely was never intended to fall on such poor industrious adventurers; and which, without this assistance, would have proved a most effectual bar to the employment of these materials.

There are now erected in the mofs 69 brick-houses, substantially built with lime. The total expence amounted to 1033 l. Sterling. And it is a very comfortable circumstance, that the money expended upon these houses is mostly kept in circulation among the inhabitants themselves: for as a number of them have learned not only to manufacture but also to build bricks, and as others who have horses and carts furnish the carriage of lime and coals, they thus interchange services with each other.

With a view to excite the exertion of the colonists, the following premiums have lately been offered: 1. To the person who shall in the space of one year remove the greatest quantity of mofs down to the clay, a plough of the best construction. 2. To the person who shall remove the next greatest quantity, a pair of harrows of the best kind. 3. For the next greatest quantity, a spade of the best kind, and 10 lb. of red clover-feed. But as these premiums, if contested for by the whole inhabitants, could reach but a very few of the number, they have therefore been divided into six districts according to their situation, and the above premiums have been offered to each district.

The establishment of this colony has no doubt been attended with a very considerable share of expence and difficulty; for the undertaking was altogether new, and there were many prejudices against it, which it was necessary to overcome. At the same time it was noble and interesting: it was to make a valuable addition to private property: it was to increase the population of the country, and to give bread to a number of people; many of whom having been turned out of their farms and cottages in the Highlands, might otherwise, by emigration, have been lost to their coun-

try; and that too at a time when, owing to the great enlargement of farms, depopulation prevails but too much even in the low countries. And it was to add to the arable lands of the kingdom, making many thousand bolls of grain to grow where none ever grew before.

These considerations have hitherto preponderated with the proprietors against the various obstacles that present themselves to the execution of so extensive an undertaking. Should their example tend in any degree to stimulate others, who both in Scotland and in England possess much ground equally useless to the country, to commence similar improvements, it would be a most grateful consideration superadded to the pleasure already arising from the progress of the infant colony.

Moss-Troopers, a rebellious sort of people in the north of England, that lived by robbery and rapine, not unlike the tories in Ireland, the bucaniers in Jamaica, or banditti of Italy. The counties of Northumberland and Cumberland were charged with an yearly sum, and a command of men, to be appointed by justices of the peace, to apprehend and suppress them.

MOSTRA, in the Italian music, a mark at the end of a line or space, to show that the first note of the next line is in that place: and if this note be accompanied with a sharp or flat, it is proper to place these characters along with the mostra.

MOSUL, or **MOUSUL**. See **MOUSUL**.

MOTACILLA, in ornithology, the **WAGTAIL** and **WARBLER**: A genus of birds of the order of passerines; distinguished by a straight weak bill of a subulated figure, a tongue lacerated at the end, and very slender legs.

Moss
||
Motacilla.Plate
CCCXV.

1. The *alba*, or white wagtail; frequents the sides of ponds and small streams, and feeds on insects and worms. The head, back, and upper and lower side of the neck, as far as the breast, are black; in some the chin is white, and the throat marked with a black crescent: the breast and belly are white; the quill-feathers are dusky; the coverts black, tipped and edged with white. The tail is very long, and always in motion. Mr. Willoughby observes, that this species shifts its quarters in the winter; moving from the north to the south of England during that season. In spring and autumn it is a constant attendant on the plough, for the sake of the worms thrown up by that instrument. These birds make their nest on the ground, composed of dry grass, fine fibres of roots, and mofs lined within with hair or feathers. The eggs are five in number, white, spotted with brown; and for the most part there is only one brood in a year.

2. The *flava*, or yellow wagtail, migrates in the north of England, but in Hampshire continues the whole year. The male is a bird of great beauty: the breast, belly, thighs, and vent-feathers, being of a most vivid and lovely yellow: the throat is marked with some large black spots; above the eye is a bright yellow.

(c) This does not apply to the *morafs*, upon the surface of which, it has already been observed, it is impossible to erect houses in any shape.

Motacilla. yellow line: beneath that, from the bill, cross the eye, is another of a dusky hue; and beneath the eye is a third of the same colour: the head and upper part of the body is of an olive-green, which brightens in the coverts of the tail; the quill-feathers are dusky; the coverts of the wings olive-coloured; but the lower rows dusky, tipped with yellowish white; the two outermost feathers of the tail half white; the others black, as in the former. The colours of the female are far more obscure than those of the male: it wants also those black spots on the throat. It makes its nest on the ground, in corn-fields: the outside is composed of decayed stems of plants, and small fibrous roots; the inside is lined with hair: it lays five eggs.

3. The regulus, or gold-crested wren, is a native of Europe, and of the correspondent latitudes of Asia and America. It is the least of all the European birds, weighing only a single drachm. Its length is about four inches and an half; and the wings, when spread out, measure little more than six inches. On the top of its head is a beautiful orange-coloured spot called its *crest*, which it can hide at pleasure; the margins of the crest are yellow, and it ends in a pretty broad black line; the sides of the neck are of a beautiful yellowish green; the eyes surrounded with a white circle; the neck and back of a dark green mixed with yellow; the breast of a dirty white; the tail composed of 12 feathers of a brown colour, an inch and an half long, but not forked. In America it associates with the titmice, running up and down the bark of lofty oaks with them, and collecting its food in their company, as if they were all of one brood. It feeds on insects lodged in their winter dormitories in a torpid state. It is said to sing very melodiously.

4. The sialis, or blue-bird, is a native of most parts of North America; and is about the bigness of a sparrow. The eyes are large; the head and upper part of the body, tail, and wings, are of a bright blue, excepting that the ends of the feathers are brown. The throat and breast are of a dirty red. The belly is white. It flies swiftly, having very long wings; so that the hawk generally pursues it in vain. It makes its nest in holes of trees; resembles our robin-red breast in its disposition, and feeds only on insects.

5. The sutoria, or taylor-bird, is a native of the East-Indies. It is remarkable for the art with which it makes its nest, seemingly in order to secure itself and its young in the most perfect manner possible against all danger from voracious animals. It picks up a dead leaf, and sews it to the side of a living one: its slender bill is the needle, and its thread is formed of some fine fibres; the lining is composed of feathers, gossamer, and down. The colour of the bird is light-yellow; its length three inches; and its weight only three-sixteenths of an ounce: so that the materials of the nest and its own size are not likely to draw down a habitation depending on so slight a tenure.

6. The lucinia, or nightingale, exceeds in size the hedge-sparrow. The bill is brown: the irides are hazel: the head and back pale tawny, dashed with olive: the tail is of a deep tawny red; the under parts pale ash-colour, growing white towards the vent: the quills are cinereous brown, with the outer margins reddish brown: the legs cinereous brown. The male and female are very similar. This bird, the most famed

of the feathered tribe for the variety, length, and sweetness of its notes, is migratory, and supposed to be an inhabitant of the Asiatic regions during such times as it is not to be found in Europe. It is met with in Siberia, Sweden, Germany, France, Italy, and Greece; but in all those places it is migratory, as in England. Hasselquist speaks of it as being in Palestine; and Fryer ascertains its being found about Chulminor in Persia: it is also spoken of as a bird of China, Kamtschatka, and Japan; at which last place they are much esteemed, and sell dear; as they are also at Aleppo, where they are "in great abundance kept tame in houses, and let out at a small rate to such as choose it in the city, so that no entertainment is made in the spring without a concert of these birds." They are not found in America, though several of their birds improperly bear that name; and it is uncertain whether they are found in Africa. This bird visits Britain in the beginning of April, and leaves us in August; and during its continuance with us its range is confined to but a part of the island: it is not found in Scotland, Ireland, or North Wales, nor in any of the northern counties except Yorkshire; and it does not migrate so far to the west as Devonshire and Cornwall. They are solitary birds, never uniting into even small flocks; and in respect to the nests, it is very seldom that two are found near each other. The female builds in some low bush or quickset hedge well covered with foliage, for such only this bird frequents; and lays four or five eggs of a greenish brown. The nest is composed of dry leaves on the outside, mixed with grass and fibres, lined with hair or down within, though not always alike. The female alone sits on and hatches the eggs, while the male not far off regales her with his delightful song; but as soon as the young are hatched, he commonly leaves off singing, and joins with the female in the task of providing for and feeding them. After the young can provide for themselves, the old female provides for a second brood, and the song of the male recommences. They have been known to have three broods in a year, and in the hot countries even four. These birds are often brought up from the nest for the sake of their song. They are likewise caught at their first coming over; and though old birds, yet by management can be made to bear confinement, and to sing equally with those brought up from the nest. None but the vilest epicure, as Mr Latham remarks, would think of eating these charming songsters; yet we are told that their flesh is equal to that of the ortolan, and they are fattened in Gascony for the table. Every school-boy must have read of Heliogabalus eating of nightingales tongues; and that famed dish of the Roman tragedian Æsop, which was composed of those of every singing or talking bird, and is said to have cost about L. 6843 of our money.

7. The hippolais, or pettychaps, is somewhat less than a linnet. The bill is short; the upper mandible black, the under bluish; above and below the eye there is a yellowish line: the head, neck, and upper parts are of a greenish ash-colour; the quills and tail of a mouse-colour, with greenish edges and black shafts; and the under wing-coverts are yellow: the belly is of a silvery white; the breast darker, and tinged with yellow; the legs are bluish or lead-coloured. This species is frequent in several parts of England, and makes a nest of

Motacilla of an arched form, composed of dry bents, mixed with a little moss, and thickly lined with feathers: it is placed on the ground under a tuft of grass or at the bottom of a bush. The eggs are five in number, white, sprinkled all over with small red spots, most so at the largest end. In Dorsetshire it is known by the name of *hay-bird*. In Yorkshire it is called the *beam-bird*, from its nestling under beams in outbuildings.

8. The *atricapilla*, or blackcap, is smaller than the *pettichaps*. The bill is brown: the top of the head is black; and the upper parts of the body are of a greenish ash-colour: the sides of the head and under parts are grey, changing to very light grey, or almost white, towards the vent: the quills and tail are cinereous brown, margined with the same colour as the upper parts: legs are lead-coloured, and the claws black. This bird is pretty common in England, and elsewhere in Europe, as far as Italy; in all which places it is known to breed; coming in spring, and retiring in September. In Italy it builds twice in the year; with us only once. The nest, which is generally placed in some low bush not far from the ground, is composed of dried stalks, mixed with a little wool and green moss round the verge; the inside lined with the fibres of roots, thinly covered with black horse-hair. The eggs are five in number; of a pale reddish brown, mottled with a deeper colour, and sprinkled with a few dark spots. The male and female sit by turns during incubation; and the young very early leap out of the nest, especially if any one approaches it, and forsake it for ever. The food is chiefly insects; but in defect of these they will eat the fruits of spurge laurel, service, and ivy; and seems to be even fond of the last, as they much frequent such trees as are overgrown with it. The song is much esteemed, and in many things almost equalling the nightingale itself; scarcely deficient, except in the delightful variety of note of the last named bird. Hence by many it has been named the *mock nightingale*.

9. The *modularis*, or hedge-sparrow, a well-known bird, has the back and wing coverts of a dusky hue edged with reddish brown; rump of a greenish brown; throat and breast of a dull ash-colour; the belly a dirty white; and the legs of a dull flesh-colour. This bird frequents hedges in England; where it makes its nest of moss and wool, lining it with hair; and lays four or five eggs of a fine pale blue. With us and the more northern regions it is seen at all seasons; but in France it is migratory, coming in October and departing northward in spring. The note of this bird would be thought pleasant, did it not remind us of the approach of winter; beginning with the first frosts, and continuing till a little time in spring. Its often repeating the words *tit, tit, tit*, has occasioned its being called *titling*; a name it is known by in many places.

10. The *phœnicurus*, or red start, is somewhat less than the red-breast: the forehead is white; the crown of the head, hind part of the neck, and back, are deep blue grey; the cheeks and throat black; the breast, rump, and sides, red; and the belly is white: the two middle tail-feathers are brown; the rest red; and the legs are black. The female has the top of the head and back cinereous grey; chin white. The same parts are red in this sex as in the male, but not

so bright. The wings are brown in both sexes. This *Motacilla* bird is migratory; coming hither in spring, and departing in autumn about October. It is not so shy as many birds in respect to itself; for it approaches habitations, and frequently makes its nest in some hole of a wall where numbers of people pass by frequently: yet it is content, if no one meddles with the nest; for the least derangement of the eggs, or almost looking at them, especially if the female is disturbed thereby, causes her to forsake the nest altogether. It frequently builds also in some hole of a tree. The nest is composed chiefly of moss, lined with hair and feathers. The eggs are blue, and four or five in number. This bird frequently wags its tail; but does it sideways like a dog when he is pleased, and not up and down like the wagtail. It is with difficulty that these birds are kept in a cage; nor will they submit to it by any means if caught old. Their song has no great strength: yet it is agreeable enough; and they will, if taught young, imitate the note of other birds, and sing by night frequently as well as in the day-time.

11. The *salicaria*, or sedge-bird, is about the size of the blackcap, but more slender. The head is brown, marked with dusky streaks: the cheeks are brown; with a white line over each eye, and above that a black one: the upper parts of the neck and back are of a reddish brown; and the wing-coverts and quills dusky: the under parts are white; but the breast and belly have a yellow tinge: the tail is brown, and much rounded; and the legs are dusky. This bird is common in England, and frequents places where reeds and sedges grow, among which it is said to make the nest, though it has been known to do this on the lowest branches of trees. The nest is composed of straw and dried fibres of plants, lined with hair; and the eggs five in number, of a dirty white, marbled with brown. It is observed to imitate the note of the swallow, sky-lark, house-sparrow, and other birds, in a pleasing but hurrying manner, and sings all night.

12. The *siœdula*, or epicurean warbler, is in length five inches: the upper parts are grey brown; the under parts greyish white, with a tinge of brown on the breast; and the legs are blackish. This is a bird much esteemed on the continent for the delicate flavour of its flesh. Their chief food is insects; except in autumn, when they make great havock among the figs and grapes; whence it is supposed their great delicacy in some measure arises. It is not found in England, but met with in most of the intermediate parts between Sweden and Greece; where, however, it is only a summer-inhabitant, probably retiring still more south at the approach of winter. In the isle of Cyprus and Candy they abound greatly, insomuch as to be an article of commerce. They transport them in vessels filled with vinegar and sweet herbs: the isle of Cyprus alone collects 1000 or 1200 of these pots every year.

13. The *rubecula*, or red-breast, is universally known: the upper parts are of a greenish ash-colour; the forehead, throat, neck, and breast, a rufous orange; the belly and vent whitish; the bill, legs, and sides of the body, dusky. It is a constant inhabitant of these kingdoms, as well as the whole European continent from Sweden to Italy. It abounds in Burgundy and Lorraine, where numbers are taken for the table, and thought

Motacilla. thought excellent. It builds not far from a house, or retired part of some old building. The nest is composed of dried leaves, mixed with hair and moss, and lined with feathers. The eggs are of a dusky white, marked with irregular reddish spots; and are from five to seven in number. The young, when full feathered, may be taken for a different bird, being spotted all over. The first rudiments of the red break forth on the breast about the end of August; but it is quite the end of September before they come to the full colour. Insects are their general food; but in defect of these they will eat many other things. No bird is so tame and familiar as this; closely attending the heels of the gardener when he is using his spade, for the sake of worms; and frequently in winter entering houses where windows are open, when they will pick up the crumbs from the table while the family is at dinner. Its familiarity has caused a petty name to be given it in several countries. The people about Bornholm call it *Tommi-liden*; in Norway, *Peter Ronfmad*; the Germans, *Thomas Gierdet*; and we, the *Robin Red-breast*.

14. The *rubicola*, or stone-chatter, is in length about four inches and three quarters. The male has the upper parts of the body mixed blackish and pale rufous: on each side the neck there is a transverse streak of white: the breast is of a reddish yellow; the belly paler: and the legs are black. The female has the colours much less vivid. This bird inhabits dry places, such as heaths and commons; living on insects of all kinds. It makes its nest early, at the foot of some low bush, or under a stone; and lays five or six eggs of a bluish green, sparingly marked with faint rufous spots. It is so very crafty as not to betray the place of the nest, never alighting but at some distance, and creeping on the ground to it by the greatest stealth. It is a restless bird, incessantly flying from bush to bush; and seems to have received its English name from its note, resembling the clicking of two stones together.

15. The *rubetra*, or whin-chat, is somewhat bigger than the stone-chatter. The upper parts are blackish, edged with rufous: from the bill arises a streak of white, which passes over the eye on each side, almost to the hind head: beneath this the cheeks are blackish; the chin is white; the rest of the under parts rufous white: on the wing, near the shoulder, is a transverse white mark, and another smaller near the bastard wing, on the outer edge: the legs are black. The female differs in being paler, and the spots on the wings and the white trace over the eye being far less conspicuous. This is not uncommon in Britain, and is seen along with the stone-chatter on the heaths during the summer months; where it breeds, making the nest much after the manner of that bird. It lays five dirty white eggs, dotted with black. This species is common also on the continent of Europe, in France, Italy, Germany, and the more temperate parts of Russia; but it is said to be less common than the stone-chatter there, as it is also in England. Its food is chiefly insects; and is said to be as good as the ortolan, when fat and in good condition.

16. The *œnanthe*, or wheat-eat, is in length five inches and a half. The top of the head, hind part of the neck, and back, are of a bluish grey; and over

the eye a streak of white: the under parts of the body yellowish white, changing to pure white at the vent: the breast is tinged with red; and the legs are black. This bird is met with in most parts of Europe, even as far as Greenland; and specimens have also been received from the East Indies. It visits England annually in the middle of March, and leaves us in September. It chiefly frequents heaths. The nest is usually placed under shelter of some turf, clod, stone, or the like, always on the ground, and not unfrequently in some deserted rabbit-burrow. It is composed of dry grass or moss, mixed with wool, fur of the rabbit, &c. or lined with hair and feathers. The eggs are from five to eight in number, of a light blue, with a deeper blue circle at the large end. The young are hatched the middle of May. In some parts of England these birds are in vast plenty. About East-bourn in Suffex they are taken in snares made of horse-hair placed beneath a long turf: Being very timid birds, the motion of a cloud or the appearance of an hawk will drive them for shelter into these traps, and so they are taken. The numbers annually ensnared in that district alone amount to about 1840 dozen, which usually sell at sixpence per dozen. Quantities of these are eaten on the spot by the neighbouring inhabitants; others are picked, and sent up to the London poulterers; and many are potted, being as much esteemed in England as the ortolan on the continent. Their food is insects only; though in rainy summers they feed much on earth-worms, whence they are fattest in such seasons.

17. The *cyanea*, or superb warbler, a most beautiful species, is five inches and a half long. The bill is black: the feathers of the head are long, and stand erect like a full crest; from the forehead to the crown they are of a bright blue; from thence to the nape, black like velvet: through the eyes from the bill there runs a line of black; and beneath the eye springs a tuft of the same blue feathers; beneath which, and on the chin, it is of a deep blue almost black, and feeling like velvet: on the ears is another patch of blue, and across the back part of the head a band of the same; the whole giving the head a greater appearance of bulk than is natural: the hind part of the neck, and upper parts of the body and tail, are of a deep blue black; the under, pure white: the wings are dusky; the shafts of the quills chestnut: the legs are dusky brown; the claws black. It inhabits Van Diemen's Land, the most southern part of New Holland. The female of this species, of which a figure is given in Phillip's Voyage to Botany Bay, is discovered to be entirely destitute of all the fine blue colours, both pale and dark, by which the male is adorned, except that there is a very narrow circle of azure round each eye, apparently on the skin only: all the upper feathers consist of shades of brown, and the whole throat and belly is pure white. Except from the shape and size, this bird would not be suspected at first sight to belong to the same species as the male: the epithet of *superb* applies very ill to the female.

18. The *troglydites*, or wren, is a very small species, in length only three inches three quarters, though some have measured four inches. The bill is very slender, and of a dusky brown colour: the head, neck, and back, are of a reddish brown; and over each eye



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